NETWORK WORLD

THE WEEKLY FOR LEADING USERS OF COMMUNICATIONS PRODUCTS & SERVICES VOLUME 4, NUMBER 12 MARCH 23, 1987

FEATURE FOCUS

COMMUNICATIONS SOFTWARE

Shooting for connectivity

SNA users are aiming to send 3270 traffic over X.25 nets.

BY MARVIN CHARTOFF
Special to Network World

Until recently, asynchronous terminals represented the majority of computer equipment using the CCITT's X.25 packet-switching standard. As the demand for synchronous terminal communications with host computers across X.25 nets increased, vendors responded by developing packet assembler/disassemblers. PADs support protocols that include Sperry Corp.'s Univac Uniscope, Burroughs Corp.'s Poll/Select, Honeywell, Inc.'s VIP, IBM's 3270 Binary Synchronous Communications, IBM 2780/3780

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▶ SYSTEMS APPLICATION ARCHITECTURE

IBM software plan unifies systems

Interface set answers connectivity needs.

BY PAUL KORZENIOWSKI
Senior Editor

IBM laid out a framework last week for developing applications that run across all of its major hardware lines with the introduction of an applications architecture the company likened to its Systems Network Architecture.

IBM's Systems Application Architecture (SAA) defines software interfaces, protocols and other conventions that will enable users and software developers to write applications that will be compatible with future offerings in IBM's Personal Computer family, System/3X and System/370 processor lines. IBM also promised to develop its own applications under SAA.

The company said implementation of SAA, like the implementation of SNA, would be an evolutionary process. IBM will first provide documentation that defines SAA and later products that fall under the SAA umbrella.

In its introduction of SAA, IBM reiterated its support for a multiple-hardware architecture strategy, but the company acknowledged the importance of providing a blueprint for development of portable applications.

The SAA blueprint consists of four related elements: Common User Access, Common Programming Interface, Common Communications Support and Common Applications.

Common User Access defines the basic elements of the end-user interface to appli-

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Critics laud strategy, warn of long wait.

BY PAUL KORZENIOWSKI
Senior Editor

IBM's announcement last week of the Systems Application Architecture (SAA) is a major step toward resolving the problems involved in developing applications that run across IBM's strategic hardware offerings. But it could be a long time before users see the first tangible benefits of SAA, analysts told *Network World.*

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IBM's Systems Application Architecture

Common Applications — Calls for IBM to develop applications that can run across IBM System/370, System/3X and Personal Computer environments.

Common User Access — Defines a consistent end-user interface, including screen layouts and menus, to all IBM applications and environments.

Common Programming Interface — Describes programming tools used in developing applications that can be integrated with other applications and ported to multiple IBM environments.

Common Communications Support — Outlines the protocols, products and services used to interconnect applications, systems, networks and devices.

▶ CUSTOMER SUPPORT

IBM stations net pros at user sites

Staffers aid in service, design.

BY PAUL KORZENIOWSKI
Senior Editor

In an effort to improve support and bolster sales of telecommunications products to its largest customers, IBM has for the last 12 months been quietly placing dedicated telecommunications support personnel at select customer sites, *Network World* has learned.

The full-time support personnel, called telecommunications unit managers (TUM), complement the on-site software engineers IBM has traditionally dedicated to key accounts. Like the software engineers, TUMs spend their time working with the customer and are expected to un-

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NETWORK LINE

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Bytex will unveil this week a scaled-down version of its Autoswitch 4000 distributed matrix switch. The new switch will support up to 1,024 nonblocked ports. Page 2.

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Interface '87's sponsor says more than 12,000 attendees will be on hand for the communications conference next week. Deregulation and network management will be among the key issues discussed at the show. Page 2.

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Caterpillar moves earth to install a fiber-optic net that links six communications facilities and has slashed costs by nearly one-third. Page 7.

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Electronic mail has been greatly enhanced and demystified over the years, yet it has gained only a toehold in the communications market. Page 35.

NEWSPAPER

▶ LOCAL NET STRATEGIES

Broker gets boost from high-end LAN

BY PAULA MUSICH
Senior Editor

NEW YORK — Brokerage house Morgan Stanley & Co., Inc. said last week it will bolster the capabilities of its existing IBM mainframe-based automated securities trading system with the implementation of a $1 million Ethernet-based network of high-performance workstations.

The network will be used initially by researchers developing more advanced automated trading programs. It will eventually be tied into the mainframe system, which automatically places orders to buy and sell securities, to

See **Morgan Stanley** page 42

▶ PRIVATE NETWORKS

New 5ESS users group to meet with AT&T

BY MICHAEL FAHEY
Staff Writer

LISLE, Ill. — A newly formed group made up of private organizations that use AT&T's 5ESS switch will meet here this week with representatives of AT&T Networks Systems Group to discuss the strengths, shortcomings and future development of Network Systems' flagship product.

The role of the 5ESS switch in delivering Integrated Services Digital Network services will be a major topic of conversation, according to members of the 5ESS Users Group contacted by *Network World*. "We are trying to get users involved in the development process," said Karl Kuhn, telecommunications manager with Pratt & Whitney Aircraft Group, which recently installed a 5ESS switch at its Hartford, Conn., facility. "The real purpose of the organization is to work with AT&T and other users in developing the 5ESS and its ISDN capabilities."

Pratt & Whitney hosted the first meeting of the group this summer. Representatives from Wang Laboratories, Inc., Massachusetts Institute of Technology, Duke University and Boeing Corp., all of which have installed or are scheduled to install the 5ESS, attended the summer kickoff meeting. No representatives from Merrill Lynch & Co., Inc. were able to attend the first meeting because the brokerage house was in the process of cutting over its 5ESS switch, but the company will be represented here this week.

In addition to 5ESS users, the group has also offered membership to users of 5ESS-based Centrex services. "The group is particularly oriented toward on-site utilization of 5ESS machines, but we don't exclude people who represent organizations whose switch is sitting in a central office," said Mort Berlin, director of telecommunications at MIT.

Berlin said MIT will install 5,000 AT&T ISDN terminals when it cuts over its 5ESS switch in June 1988.

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▶ CROSS-SUBSIDIZATION

GAO investigating FCC

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — The U.S. General Accounting Office (GAO) is seven months into an investigation of the FCC's ability to detect when Bell operating companies are using monopoly monies to cross-subsidize competitive ventures.

The GAO investigation, which came to light last week, was spurred by a request from members of the U.S. House of Representatives' Telecommunications Subcommittee last August.

At the time, Congress was considering now-defunct bills that would have lifted restrictions governing BOC business practices and wanted to make sure the FCC had the proper methods in place to police the companies.

Although the bills have since been squelched, the investigation has been given new importance by the recent Department of Justice proposal to allow the BOCs into many new lines of business, including long distance.

The GAO is examining audit reports prepared by the FCC Common Carrier Bureau's Accounting and Audits Division, dating back to the divestiture of AT&T on Jan. 1, 1984. It will also look at the FCC's proposed cost-allocation rules released last February.

The GAO division in charge of all FCC-related work has been looking at the FCC's public records and was recently granted permission to examine proprietary information submitted to the FCC by carriers such as AT&T and the BOCs. The FCC voted to release the information to the GAO as required by the 1934 Communications Act.

"One of the biggest concerns now facing the telecommunications industry is whether the BOCs should be allowed into new unregulated areas," said Ron Wood, group director of the Resources, Community and Economic Development (RCED) division of the GAO.

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▶ AUTOSWITCH 1000

Bytex downsizes switch

BY PAUL KORZENIOWSKI
Senior Editor

SOUTHBOROUGH, Mass. — Bytex Corp. this week plans to introduce a scaled-down model of its recently announced redundant distributed matrix switch, *Network World* has learned.

The Autoswitch 1000, which can support up to four satellite closets, 63 network nodes and as many as 1,024 nonblocked ports, is a smaller version of the company's Autoswitch 4000. The larger switch was announced last September and supports up to 4,096 nonblocked ports.

Matrix switches are typically used to switch incoming communications lines to spare computer front-end processors when primary front-end processors fail. They are heavily used in banking, transportation and other industries that are highly dependent on network uptime.

The switches can also be used in networks to reroute lines at predetermined intervals. A company may, for example, alter its network configuration at night to accommodate a large amount of batch traffic being transmitted from remote offices.

The Autoswitch 1000 supports RS-232, V.35 and analog leased-line connections used for synchronous or asynchronous transmission.

According to Bytex, the Autoswitch 1000 is unique because all of its network components are redun-

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▶ INTERFACE '87

Network management tops show concerns

BY JOSH GONZE
Staff Writer

LAS VEGAS, Nev. — Network management and deregulation will be the uppermost concerns in the minds of the more than 12,000 attendees expected at this week's Interface '87 conference here, according to speakers scheduled to host show sessions.

The Interface Group, Inc., sponsor of the 15th annual event, is forecasting a larger turnout this year than in 1986. Thirty percent more exhibitors are scheduled to participate in the show, and the number of attendees preregistered for the conference is up 20% over last year.

Seventy conference sessions spread over the four days of the show will give users a chance to delve into the top issues of the communications industry. A number of product introductions are also slated (see "Show hosts raft of product debuts," page 38).

Deregulation will take center stage as the show opens. Sen. Timothy Wirth (D.-Colo.) will give Interface's keynote address, which is expected to focus on communications reform and U.S. competitiveness in global telecommunications markets, according to the senator's aides. Wirth was chairman of the House Subcommittee on Telecommunications, Consumer Protection and Finance from 1980 to 1986.

A cadre of attorneys will appear at sessions designed to update users on key regulatory and legal changes that could take shape this year. "In 1987, a lot of significant issues will be before both the regulators and congress," said Stephen

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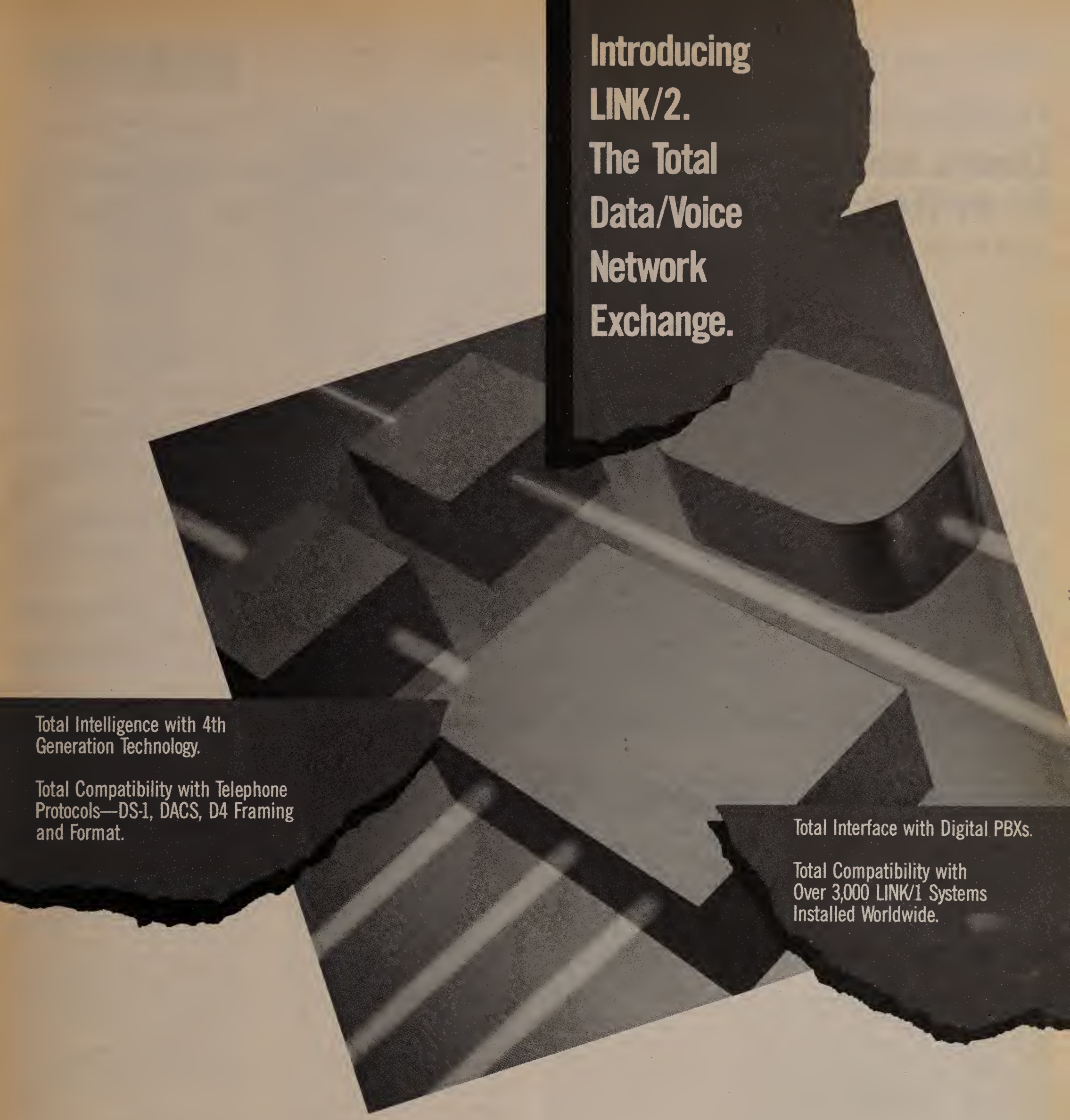
COMMUNICATIONS MANAGER

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▶ INTERNATIONAL SWITCHING SYMPOSIUM

Users examine latest in switching technology

BY BOB WALLACE
Senior Editor

PHOENIX — Although Integrated Services Digital Network was, predictably, a hot topic at last week's 12th International Switching Symposium here, much of the forum was dedicated to evolving technologies, including wideband packet switching, broadband switching and light switching.

More than 3,500 electrical engineers and research and development personnel gathered to discuss advances in digital switching and to witness demonstrations of advanced switching technology.

AT&T displayed a variety of switching innovations still in the laboratory. The carrier's exhibition featured an experimental photon switch, a wideband packet switch that switched video at 45M bit/sec and at 140M bit/sec, as well as a wideband packet switch capable of switching packets containing voice, data and video signals.

Northern Telecom, Inc. demonstrated an experimental multimedia teleconferencing system and a network design tool intended to help users calculate how ISDN will affect their networks.

The software design tool, Planet Release 1.0 Network Planning Tool, runs on a Northern Telecom M6000 and enables users to experiment with network configurations that include ISDN switches and remote switch units. The vendor said this software would likely be introduced before year end.

Northern Telecom's Multimedia Teleconferencing System, designed to operate over a single ISDN line, is intended to enable users at dispersed locations to engage in a teleconference while viewing, and altering, graphics displayed on a workstation. Participants can also transmit freeze-frame video pictures of themselves to one another. No commercial release date was given for this system.

Although the show concentrated on switch advances, AT&T representatives leading sessions talked about services the new technologies would make possible.

Gottfried Luderer, director of exploratory network switching development with AT&T Bell Laboratories, addressed the need for and technology behind wideband switching, also referred to as fast packet switching.

"Our goal was to find a technology that enabled voice, data and video to be sent over a singie transmission facility," Luderer said. "AT&T's network is a telephone network. My guess is that this technology would be used to support high-speed data communications over the same network."

The fast packet technology uses a bit-dropping method that enables digitized voice, data and video information to be shoe-horned into the same packets, Luderer said. Bits that represent pauses in voice conversations are dropped from the packets without noticeable degradation of the voice signals.

Luderer said the equipment needed to switch such packets could be added to currently installed AT&T 5ESS digital central office switches, but he would not say when the technology would be available. Other conference speakers who addressed wideband packet switching speculated that the technology could appear in the AT&T network in the early 1990s.

AT&T also demonstrated two

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▶ NETWORK PIONEERS

ISDN test users wary of pricing

BY BOB WALLACE
Senior Editor

PHOENIX — Early participants in Bell operating company ISDN field trials said the technology holds promise, but they will not put off plans to upgrade out-of-date systems while waiting for it.

Attending the 12th International Switching Symposium here last week were representatives from two of the nation's first companies to conduct Integrated Services Digital Network field tests. They told *Network World* that many ISDN issues remain unsolved, including how the future services will be priced.

Long touted by local and long-distance carriers and switchmakers alike, ISDN promises to enable users to meld voice and data networks, reduce the complexity of network access and extend network control to users.

Mountain Bell, Pacific Northwest Bell and Illinois Bell already have ISDN trials under way. These trials are testing the Basic Rate Interface, or so-called 2B+D access. Each B channel operates at 64K bit/sec and can carry voice or data, and the D channel, which is intended to carry signaling for call setup and other functions, operates at 16K bit/sec.

The Bell operating companies have yet to establish pricing for ISDN because they have not determined service provisioning costs, early users said. These costs are dependent, in part, on the cost of ISDN terminal gear. The lion's share of this equipment was made especially for the trials and is still in the prototype stage.

Barry Eckart, director of ISDN for Northern Telecom, Inc., said ISDN would not become commercially significant until mid-1989. In the interim, a number of ISDN field trials will be held and ISDN products will start to roll out, he said.

Loren Henry, director of ISDN planning at US West, Inc., said his regional Bell holding company will seek to make ISDN service available in a nontariffed environment in mid-1988.

Larry Beauchat, communications manager for the Arizona Department of Administration in Phoenix, said he is pleased with the ISDN service the agency receives but is uncertain of future plans for ISDN. "I don't know anyone who knows what the service is going to cost," he said. "[Mountain Bell] can't tell me how much a line is going to cost or how many central offices will support ISDN."

Beauchat said the department, which currently uses a Common Channel Switching Arrangement (CCSA) — an older switched private-line service still used by a few large firms — is looking to replace CCSA with an interim solution, instead of waiting for ISDN. The department provides communications services to 16 cities.

"There is no guarantee that this old [CCSA] network offering will be available a year from now. We are looking at using switched facilities that will position us to use ISDN in the 1990s," Beauchat said.

The Department of Administration is one of three users receiving ISDN service as part of Mountain Bell's first field trial. The service is provided with a Northern Telecom, Inc. DMS 100 digital switch located at Mountain Bell's Main Central Office here.

Beauchat said the group is testing the feasibility of using ISDN to support integrated voice and data, flexible data base access and private-line elimination. Applications supported include a job applicant tracking system, an application that handles purchasing for the Administration Department and an arrangement that enables the group's director and six assistant directors to exchange calendars while speaking to one another over their telephones.

The communications manager said there is little financial or operational risk in the trial because the department does not pay for the equipment or facilities used, and because redundant non-ISDN lines run alongside ISDN service lines. "If the ISDN service fails, we can still operate our communications systems," Beauchat noted.

John Amidon, deputy manager of information systems and operations for the Arizona Department of Transportation, said he is using ISDN services to tie NCR Corp. PC6

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▶ PC NETWORKS

3Com set to preview diskless workstation

AT-compatible operates over Ethernet.

BY PAULA MUSICH
Senior Editor

SANTA CLARA, Calif. — 3Com Corp. is expected this week to give analysts an advance look at its new 3Station, an IBM Personal Computer AT-compatible diskless workstation that will be manufactured by the local network maker.

According to sources who have seen the product, the 3Station will operate in a 3Com Ethernet net running 3+ software on 3Com's network servers. It reportedly will be equipped with at least 1M byte of random-access memory, a built-in Ethernet adapter, an enhanced graphics adapter, and serial and parallel ports for connecting printers, modems and a mouse interface.

The workstation's memory can be expanded up to 4M bytes. It will not have any moving parts, such as a fan, and it has no expansion slots for add-on boards.

The workstation is expected to be officially announced March 30.

Because the workstation does not reserve memory for expansion slots — unlike general-purpose personal computers — additional memory can be allocated to the network operating system software. That leaves more memory available for memory-intensive applications — up to 30% for applications running under Microsoft Corp.'s Windows, sources were told by 3Com.

"The idea is that if you're building a network workstation from the ground up, there are performance enhancements you can make compared to a more general-purpose configuration that is marketed without a disk," said Dave Terrie, editor of "Network Monitor," an industry newsletter.

The 3Station also provides direct access from its CPU to the on-board graphics adapter and network hardware. "They claim they can get 30% to 40% better performance than you can from most ATs. That's their angle on the market, which is on the opposite end of where Novell is trying to go with its [Hyundai Electronics-made] system," he continued. Novell, through its Santa Clara Systems subsidiary, will supply diskless workstations from Hyundai. These will list for under $600.

Sources expressed surprise at the workstation's $1,895 price tag, which reportedly does not include a monitor or keyboard. Fully configured, the workstation is reportedly priced at about $2,500. They said 3Com claimed the 3Station is 40% cheaper than a comparably equipped Personal Computer AT.

"The price is too high, but you need to assign value for the built-in Ethernet connection, for the enhanced graphics adapter and for the 1M byte of memory. Still, I think they mis-priced it," said a source who asked not to be named.

Some industry observers also expressed concern about the lack of a disk drive option. "The drawback is that you're compromising expandability," said Bruce Grant, MicroAge, Inc.'s director of technical support. "It's not a general-purpose machine, and that's a little problematic. You can only sell it as a component in a network."

A similar workstation with built-in links to a token-ring network will soon become available from NCR Corp. Grant, who is working with a prototype of the NCR 3390 workstation, said NCR will offer a diskless version as well as a version that includes a floppy- or hard-disk drive.

The 3390 also has a 10-MHz 80286 processor, 1M byte of RAM, serial and parallel ports, and color graphics adapter/enhanced graphics adapter graphics all built into one board, Grant said. NCR has not set a price for its workstation.

According to sources, the planned enhancements to the 3Station line due out early next year include a token-ring connection and a higher performance workstation with Ethernet connections.

▶ INTERFACE '87

Proteon to offer ProNET boosts at conference

BY PAULA MUSICH
Senior Editor

LAS VEGAS, Nev. — Local net vendor Proteon, Inc. is scheduled to introduce enhancements to its ProNET-4 token-ring network next week at Interface '87 that will make the net compatible with IBM's PC LAN Program, Advanced Program-to-Program Communications/PC, Network Basic I/O System and the 3270 Emulation Program Version 3, *Network World* has learned.

To achieve that compatibility, Proteon will enhance its personal computer network adapter card, which is currently compatible with Banyan Systems, Inc.'s Virtual Network System, Novell, Inc.'s NetWare, Transmission Control Protocol/Internet Protocol and other networking software supporting datagram protocols at the data-link level.

Specifically, the enhancements add support of IEEE 802.2 logical link control protocols to Proteon's p1340 PC and p1344 PC AT network adapters. These protocols use Class II virtual terminal connections.

According to John Shriver, product manager at Westborough, Mass.-based Proteon, most personal computer networks and networking software use the Class I datagram protocols at the data-link layer, which does not guarantee packet delivery. IBM's Token-Ring Network and its networking software are exceptions, providing guaranteed delivery, flow control and check summing.

The NETBIOS compatibility will enable Proteon to support more software. "There's a larger world of software that will now operate with our adapters because there's so much NETBIOS-compatible software," Shriver said. "Many network operating systems just require a NETBIOS interface, such as Torus [Systems, Inc.'s] Tapestry. It opens up this board to everything."

In addition, Proteon added support for IBM's Adapter Support Interface. This protocol, which is used by all IBM Personal Computer networking software, is an interface between the software and logical link control code. IBM uses both in its Personal Computer Token-Ring adapters.

The enhanced adapters are priced at $695 and will be available 30 days after receipt of order. An IBM Adapter Support Interface upgrade for existing ProNET-4 PC and AT adapters will be available on diskette at no charge.

Also to debut at Interface '87 is an IEEE 802.5 token-ring-compatible adapter for VMEbus-based technical workstations and computers. The p1542 adapter, part of Proteon's ProNET-4 line, allows computers from Sun Microsystems, Inc., Motorola, Inc., Charles River Data Systems, Inc. and others based on Motorola's VME system bus to communicate with personal computers, minicomputers and mainframes over 802.5-compatible token-ring networks.

Proteon already provides token-ring adapter boards for IBM Personal Computers, Personal Computer ATs and compatibles as well as Multibus-based processors from vendors such as Masscomp, NCR Corp. and Alliant Computer Systems Corp.

The adapter operates in VMEbus based workstations supporting 16-, 24- or 32-bit memory addressing and provides full-duplex direct-memory access between the adapter and host memory.

The p1542 is priced at $2,200, the device driver softare is $500 and diagnostic software is $250.

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▶CORPORATE CULTURE CLASH

IBM's control over Rolm heightens user anxiety

BY MICHAEL FAHEY
Staff Writer

The head of the National Rolm Users Group (NRUG) told *Network World* last week that the organization's members are concerned about the long-range effects of IBM's recent moves to exert tighter control over its Rolm Corp. subsidiary.

NRUG President Chuck Garrison said the most immediate worry for users in the wake of IBM's absorption of Rolm's marketing force is that Rolm salespeople will have less flexibility in meeting user needs. Garrison, who is also vice-president of telecommunications for the Chicago Board Options Exchange, said users are also concerned that IBM may come to exert control over Rolm's development and manufacturing, a situation he said could lead to incompatibility between future and current Rolm equipment.

Two weeks ago, IBM assigned Rolm's 6,000 salespeople to a newly formed division within its Informations Systems Group. The shift is viewed as an early step in IBM's effort to draft a unified communications strategy embracing both voice and data products.

"There are some real differences in the corporate cultures of the two companies. There is some concern that IBM will not be as free as Rolm in negotiating with individual users," Garrison said. "Rolm is one of the top switch makers and gets top dollar for its equipment. But customers were able to negotiate with Rolm to meet their individual needs. IBM may want everyone to sign a standard sales and service contract."

> "There is concern IBM will not be as free as Rolm in negotiating with users."

In the past, Rolm assured users that any new equipment it develops will be compatible with Rolm gear already installed. "IBM has not given us that promise," said Garrison.

According to Garrison, some telecommunications managers fear future integration of Rolm and IBM products may increase the role MIS managers play in telecommunications operations. "Telecommunications managers could have some real political problems in their organizations if IBM becomes more involved in Rolm's development," Garrison said.

John Saccente, vice-president of telecommunications for Tenneco, Inc. in Houston, agreed it would be logical for IBM to become more involved in designing and manufacturing future Rolm products. "The Rolm box has been out there for a while," he said. "I wouldn't be surprised if IBM was very involved in developing a new product."

But Saccente said he sees IBM's increased control over Rolm as a positive development for users. "If that means MIS has more influence over telecommunications, so be it," he said.

NRUG has enjoyed good relations with the private branch exchange maker, and the group has met with top Rolm executives, including its president, Dennis Paboojian, Garrison said. The group hopes to establish a similar relationship with IBM, he said.

▶TCP/IP CONFERENCE

Users toil with TCP/IP-to-OSI quandary

BY MARY PETROSKY
West Coast Correspondent

MONTEREY, Calif. — How to migrate TCP/IP-based networks to Open Systems Interconnect standards was a leading concern of the nearly 700 users and vendors attending last week's TCP/IP Interoperability Conference here.

The four-day conference, organized by Cupertino, Calif.-based Advanced Computing Environments, drew Transmission Control Protocol/Internet Protocol users, as well as systems integrators and vendors of TCP/IP products. During the conference, a proposed IBM Network Basic I/O System-to-TCP/IP interface, under development for the past year, was unveiled. (See "Vendors push interface," page 6).

Conference speakers contrasted immediate problems, such as the need for better methods within TCP/IP to handle network routing, with longer term concerns, such as how to accommodate the ever increasing size of the TCP/IP-based Internetwork. But overriding all these concerns was the issue of transition to networking standards based on the International Standards Organization's OSI model.

Despite some current concessions to OSI, such as a plan being drafted by Mitre Corp. to allow data to move between hosts running TCP/IP and OSI, the general consensus among conference attendees was that TCP/IP has a lot of momentum and will be used for another 10 years.

"We are drowning in short-term problems," said Dave Clark, senior research scientist at the laboratory for Computer Science at Massachusetts Institute of Technology in Cambridge, Mass., referring to the Internet network. Clark told conferees that the Internet, a collection of approximately 200 networks including Military Network, Advanced Research Projects Agency Network and National Science Foundation net, is likely to grow by another 40 networks in the short term.

Efforts to develop new routing algorithms and new transport protocols for managing transmissions between Internet-connected nets need to be coordinated, Clark stressed. "Unless we launch an organized effort, we're never going to build networks that work." During the next five years, Clark said, key issues that will need to be addressed are the size of Internet, the speed of connections among networks and network management.

"We're really going to have to understand what it takes to build a network with components managed by possibly hostile organizations," Clark said, referring to the range of net management schemes vendors currently offer.

Clark said he sees OSI running into many of the same problems, such as routing, that TCP/IP has encountered. Network specialists from several universities echoed Clark's concern about how well early OSI products will perform. With the interoperability problems the decade-old TCP/IP protocols still exhibit, Glen Trewitt, a Ph.D candidate at Stanford University, in Stanford, Calif., believes full implementation of OSI is still many years away.

Nonetheless, Trewitt's colleague, software and network engineer Phil Almquist, said OSI is being implemented much sooner than he expected. Almquist said Stanford's current migration strategy involves inplementing OSI protocols separately from TCP/IP protocols, with no conversion between the protocol stacks.

Despite the Department of Defense's commitment to move from TCP/IP to the OSI protocols, "there's going to be a long period where both protocol suites exist in the DOD community," said Phillip Gross, a member of the technical staff at Mitre.

One Defense Department attendee, who asked not to be identified, noted that the government generally turns over technology every 10 to 12 years, compared with the five-year cycle typically found with universities.

Based on this reality, Mitre is in the process of drafting a plan to allow data to move between hosts running the different protocol stacks. The two protocol stacks need to be supported both at the gateway and the host computer, Gross said. A single network on the Internet could support either two gateways, each running one protocol stack, or a single gateway running both protocol suites, he said.

To facilitate the movement of data between the two protocol stacks within a single host computer, Mitre and the National Bureau of Standards are working to develop what Gross called an application-level gateway. This application-level software would automate the multistep process of moving data between the stacks.

▶NETBIOS-TCP/IP

Vendors push interface

BY MARY PETROSKY
West Coast Correspondent

MONTEREY, Calif. — A group of local network vendors culminated a year of work last week when they proposed an informal standard specifying how Network Basic I/O System nets can be interfaced to Transmission Control Protocol/Internet Protocol nets at the TCP/IP Interoperability Conference here.

Due to the informal nature of the standard, however, users will have to bear the brunt of testing to ensure that different vendors' TCP/IP-based software will interoperate on a network.

A need arose for a standard NETBIOS-to-TCP/IP interface when vendors began offering TCP/IP support for personal computer local networks. Vendors typically implement protocols such as TCP/IP in software sold in conjunction with their network interface cards.

NETBIOS, a session-level protocol designed by IBM, does not provide a standard way to interface to the transport layer below it. As a result, vendors have been implementing different ways to interface NETBIOS to TCP/IP. Within their implementations, vendors have been free to determine their own method of establishing a session and formatting data packets.

Because of these differences, messages sent from a network node running one vendor's implementation of the protocol stack have little chance of being understood by a node running another vendor's protocol implementation.

The standard interface intended to resolve those problems was presented here last week in a 150-page document.

See **Interface** page 38

▶ FIBER OPTICS

Caterpillar nets savings

BY BOB HAMEL
Senior Editor

PEORIA, Ill. — Pressured to pare its operating costs, Caterpillar, Inc. has installed a private fiber-optic network that links five major facilities to its corporate headquarters and has cut annual communications expenditures by nearly one-third.

Caterpillar, headquartered here, is one of the world's largest manufacturers of earth moving equipment and industrial engines. Facing increasing foreign competition and a slumping market for its products, management realized that cost cutting was a key element in staying competitive.

"Since 1981, the company has tried to align its labor and business costs with the need to manufacture products," said Stan Bane, Caterpillar's telecommunications and data processing operations supervisor.

That goal, combined with pressures created by the divestiture of AT&T and industry deregulation, led to the company's decision to install a private network to replace Illinois Bell's Centrex and private-line services, and private branch exchanges leased from GTE Corp.

After considering different ways to build the private network, which had to tie scattered Caterpillar facilities to corporate headquarters here, the company decided to install a fiber-optic backbone from AT&T. Fiber was preferable to microwave, another option considered, because of its potential capacity, its security and relatively error-free transmission performance.

The now-completed network, called the Peoria Area Telecommunications System (PATS), connects six Caterpillar manufacturing, administrative and corporate locations with roughly 600 miles of fiber cable.

For voice, the star-configured fiber network supports four AT&T System/85 and four System/75 PBXs configured in an Electronic Tandem Network (ETN). The network has more than 400 dedicated-use voice lines and serves 11,000 stations. The company also maintains more than 90 WATS lines and over 500 digital data and direct outward dialing lines from its various facilities.

To lay the cable, Caterpillar purchased the right of way between facilities. Each cable contains six to 12 fiber strands. Transmission capacity is segmented into multiple T-1 channels that are, in turn, segmented into lower speed channels.

A prime requirement in Caterpillar's request for proposal was that responding vendors had to be able to do the whole job. "We didn't want to deal with a multitude of subcontractors," said Dennis Albers, the PATS project manager. "We wanted one general contractor for everything, including the telephone equipment, distribution, system installation, maintenance and network implementation."

AT&T became the vendor of choice by meeting price requirements and schedule and implementation deadlines. The company was given a one-year installation time frame. According to Bane, "AT&T had the technical experience and people to handle a job of this size and complexity."

Besides the fiber cable runs to six major Caterpillar facilities, AT&T used traditional copper wiring to network two smaller locations that had little data communications requirements. In anticipation of future communications needs, Caterpillar had AT&T lay fiber between 20 manufacturing buildings in two of the Peoria locations.

In addition to stabilizing costs, Bane indicated that the company is using high-speed data communications capabilities, made possible with the fiber, to support a number of engineering applications, computer-aided design and manufacturing applications and some image transmission among sites.

Bane is satisfied with both service and quality. "We're getting much better transmission with fiber, both in speed and quality. We've also significantly reduced data-transmission error rates, which is a real time and money saver," he said.

For telecommunications, the fiber-supported ETN provides five-digit dialing to all locations on the network, automatic least-cost route selection to off-network sites, centralized attendant service, on-line system administration and improved system management reporting.

Since the network is playing so well in Peoria, Caterpillar will take the improvements on the road. Albers indicated the company will upgrade the telecommunications facilities at 24 of its other nationwide facilities by installing similar AT&T PBX systems.

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▶ INTERNATIONAL

FCC proposes to curtail rule benefiting COMSAT

BY MICHAEL FAHEY
Staff Writer

WASHINGTON, D.C. — The Federal Communications Commission late last week proposed eliminating a policy that has benefited Communications Satellite Corp. for more than two decades.

The policy, called balanced loading, was initiated in 1966 and requires that AT&T use satellites owned by the International Telecommunications Satellite Organization for about half of its overseas traffic. COMSAT has a 25% interest in INTELSAT, a 113-nation consortium that provides satellite transmission.

The FCC drafted the balanced loading policy in 1966 to ensure that AT&T off-load some of its traffic to the newly formed COMSAT, instead of sending all its calls on its undersea cable.

When the FCC initiated the policy, satellite transmission was a less expensive form of communications than undersea cable. But developments in fiber-optic technology have lowered the cost of undersea cable transmission. In addition, INTELSAT charges high rates on its busiest transmission routes to subsidize routes with less traffic.

The cost of transmission on the busy North Atlantic telecommunications route, for example, is kept high in order to subsidize the cost of transmission to less developed areas of the world.

According to Page Montgomery, vice-president of Economics and Technology, in Boston, the elimination of the subsidy could lower the cost of transmission for users of North American telecommunications routes.

However, Montgomery said it is difficult to gauge what effect the elimination of the subsidy would have on users since it is not clear when the subsidy will be ended. Moreover, Montgomery said, other competitive factors in international communications could affect the cost of overseas transmission.

For example, Montgomery said the international market could change drastically if satellite deployment increases in the near future.

The current balanced loading policy expires at the end of this year, and the FCC has several replacement proposals. One would eliminate balanced loading in 1989. Two other plans would phase out balanced loading over longer periods of time.

"I would not be surprised if the FCC took the longer rather than the shorter period to end the subsidy," Montgomery said. "There are a lot of political considerations involved in dealing with INTELSAT and COMSAT."

5ESS from **page 2**

"We are all buying something very new," Berlin said. "The 5ESS implementation is a massive project. When you are at the front end of a wave you don't want that wave to knock you over."

Robert Uhl, director of telecommunications at Wang Laboratories, said the group's primary goal is to push for support of new 5ESS capabilities. "Our concern is mostly regarding the future — anything AT&T will tell us about the future," Uhl said. "We are part of the ISDN field trials testing a terminal-to-host connection. We will emulate that on-site here and allow our designers to have an on-site laboratory."

While long-range development of the 5ESS switch, particularly its ISDN capabilities, is the overriding concern of the membership, the group will also address more immediate concerns.

"Like any product you buy, there are inherent problems with the switch," said Kuhn. "We would like to get those right out into the open and have AT&T get them into the lab where they can be solved."

AT&T Network Systems has set up a day-long meeting between its technical support staff and members of the users group, according to Joyce Malleck, product manager for 5ESS switching.

Malleck said Network Systems was pleased by the formation of the users group. "Users groups give us a good idea of what our customers are really looking for," said Malleck. She said user input is especially important as the company begins to roll out ISDN products and services.

"We have other users groups that we have initiated," Malleck said. "The 5ESS group is closer to the kind of users group found in the data processing environment. The agenda will be controlled and set by the actual users. I think we will find this an invaluable relationship."

The initial meeting between the 5ESS users group and AT&T personnel will be held at the AT&T Network Software Center here. "We thought the users might be interested in seeing the support facility for Network Systems," said Malleck.

She said that since the Centrex users and the on-site 5ESS users would not share all of the same concerns, the Network Systems' product manager for Centrex services will conduct a separate session for Centrex users during the meeting.

▶ RESELLING RETAILER

Sears resells excess space on its SNA net

AMD is happy with its nationwide links.

BY PAM POWERS
Senior Editor

ARLINGTON HEIGHTS, Ill. — By reselling excess capacity over its Systems Network Architecture network, Sears Communications Co. has found it can defray its costs while providing cost savings and nationwide connectivity to Advanced Micro Devices, Inc. (AMD).

Sears' SNA value-added network service offers backbone transport of data to and from customer hosts and terminals with end-to-end network management. Sears handles the installation, maintenance and control for the customer.

Gary Weiss, vice-president of data communications for Sears, said Sears bills the customer in one of two ways. The customer can pay a fixed monthly fee based on the average number of characters transmitted per month, or he may pay a fixed fee plus variable pricing based on actual volume moved per month.

AMD, based in Sunnyvale, Calif., is the first Sears customer to roll out the network service to its entire organization. The company has pilot-tested the Sears service in several locations over the past three months. Now it plans to link all of its field sales office terminals to its information databases over the Sears network.

AMD uses the service for sales applications, product ship dates, pricing and product status data. AMD's field offices communicate with its mainframes through IBM 3270-type terminals.

Edward Bowden, AMD's network operations manager, is ebullient about his experience with Sears. "We are extremely pleased and impressed with the services we've received from Sears," he said.

Bowden said that working with another user, rather than a communications vendor, has been nothing but advantageous for both companies.

"We gain the benefits of interaction with Sears' systems programmers, technicians and network control people talking the same language as we do," Bowden said. "It's like working with another group of internal MIS people instead of an outside vendor."

The Sears offering also compares favorably to its competitors' in terms of price and performance. In comparison to Telenet Communications Corp., whose packet-switching service AMD formerly used, the Sears network has provided "significant cost savings and has reduced the requisite amount of accompanying hardware," Bowden noted.

Because communications with Sears is 3725-to-3725, he explained, AMD doesn't need front-end packet assembler/disassemblers and other equipment, which means reduced floor space and fewer possible points of failure.

"We have an atmosphere of mutual cooperation," Bowden said. "That is a rare thing when you work with a vendor."

Saves money and space

The road to reselling excess capacity began when Sears took a close look at the disparate networks connecting its family of Sears companies and decided to link everything over a single homogeneous SNA network.

In 1986, the company completed construction of a backbone network with multiple T-1 links connecting 18 main switching hubs and all the company's sites nationwide. The network supports 100 IBM 3725 front-end processors with IBM network management tools.

That same year, the company realized the potential resale value of the network. "Since we had invested in the expertise and a huge geographically distributed network, we felt we were in a good position to serve customers with 10 to 1,000 locations across the U.S.," said Weiss. "We decided we would look for customers that needed to communicate between their terminals and their IBM hosts."

Sears began marketing its excess network capacity in 1986. The marketing effort cost the organization very little, Weiss said, because "all we required was a minor extension of the organization to leverage the existing structure."

Show from **page 4**

new broadband switching technologies that may translate into services once the Consultative Committee on International Telephony and Telegraphy sets speeds for so-called broadband ISDN services. The CCITT is expected to address high-speed services, intended to support data and video transmissions, beginning in 1988.

Both AT&T and Northern Telecom agree a speed cap of 150M bit/sec would be placed on such services. AT&T displayed offerings running at 45M bit/sec and 140M bit/sec.

Northern Telecom said Bell Northern Research is working on broadband switching techniques, but would not divulge at what speeds they would operate.

Roy Merrills, senior vice-president of Northern Telecom's Integrated Network Systems, said Bell Northern Research is also exploring wideband packet switching and light switching technologies.

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▶ CORPORATE STRATEGY

Tellabs to face new challenges

Problems arise as analog market wanes.

BY PAM POWERS
Senior Editor

LISLE, Ill. — If you have purchased a T-1 multiplexer from AT&T, chances are you own a product made by Tellabs, Inc., a company whose soaring profits have recently made it the darling of Wall Street.

Tellabs sells data communications equipment, including a T-1 multiplexer, and Digital Access and Cross-connect Systems (DACS), to end users through companies such as AT&T, Northern Telecom, Inc. and Bell Canada. But the company's primary business is selling analog network gear, such as network channel-terminating and inband-signaling equipment, to the Bell operating companies.

Tellabs' strategy has served the company well thus far, but the firm faces a couple of potential problems. The analog equipment market is on the wane as the BOCs upgrade their central offices and as networks become paved with fiber.

Tellabs President Michael J. Birck acknowledged last week that the company will have to rely on its digital equipment, such as the T-1 multiplexer, for a greater percentage of its revenue. But the firms that now resell those products may choose to develop their own offerings, leaving Tellabs without a critical distribution channel or the marketing clout of its big partners.

Tellabs commenced operations in 1975, selling analog products targeted primarily at telephone companies. In 1980, Birck said he recognized some untapped opportunities in the data communications market, to which the company responded with the introduction of echo cancellers, and later, a T-1 multiplexer and DACS. By year-end 1986, Tellabs had achieved $115 million in sales, a 16% increase from the year before, and profits increased 31% to $34.4 million.

Birck said he attributes a large portion of the company's success to its experience in the voice arena, as most vendors have approached the market with data expertise but little knowledge of voice. "We have the advantage of understanding the structure of the voice

See **Tellabs** page 10

BRIEFS

Computer Sciences Corp. received a $5 million subcontract from **AT&T Technologies, Inc.** for development of a prototype communications system for the Federal Aviation Administration.

The Voice Switching and Control System will switch and control communications automatically between aircraft and controllers at 23 regional traffic-control centers.

$

British Telecommunications plc signed a reseller agreement with **Novell, Inc.** to provide local-area networking products to the UK.

British Telecom will bundle Novell's family of NetWare networking hardware and software with its own local network components to create a new line of products called T-Net 1000.

$

Novell, Inc. reported operating results for the first quarter of fiscal year 1987, ended Jan. 31.

Net sales in the first quarter of 1987 were $29,863,000, an increase of 106% for the similar period in fiscal 1986. Earnings per share were 31 cents, compared with 20 cents for the first quarter of the previous year.

$

Nestar Systems, Inc., a subsidiary of DSC Communications Corp., acquired **Intelligent Access.**

The expanded Nestar product line will support applications not previously feasible on a personal computer. Terms of the acquisition were not disclosed.

Interphase Corp. and **Siemens AG** announced a contract valued at more than $7.5 million. Under the contract, which extends to the end of 1988, Siemens will purchase the Interphase Storager for use in a variety of high-performance and mid-range systems incorporating Siemens Megafile disk drives.

The contract also includes Interphase's SMD 2190 disk-drive controller for systems using larger drives.

$

Colonial Data Technologies (CDT) signed an OEM agreement with **BellSouth Advanced Systems, Inc. (BSAS)** under which CDT will manufacture a line of feature telephones for resale by BSAS over a multiyear term.

INDUSTRY EYE
PAM POWERS

Long-distance carriers fight for profit

(dollars in millions)	AT&T 1986	1985
Revenue	$34,087	$34,417
Earnings	$139	$1,557

MCI Communications Corp.	1986	1985
Revenue	$3,592	$2,542
Earnings	($448)	$113

US Sprint Communications Co.*	1986
Revenue	$1,141
Earnings	($357)

* Figures for first six months of operation.

MCI chief hopes company's winter of discontent is over

After MCI Communications Corp.'s tumultuous and not terribly successful year braving the elements in the long-distance market, a lot of people are wondering if the combination of slumping rates and rising costs will bring the carrier to its knees before it manages to turn its luck around.

One good indicator of whether MCI will be able to rebound is its ability to offer new or enhanced services that can generate additional revenue. In a recent interview with *Network World*, MCI Chairman and Chief Operating Officer Bert Roberts provided some insights into the company's strategy in the area of services.

Roberts emphasized MCI's commitment to working with IBM in joint development and marketing projects, which may already be coming to fruition with the recent formation of MCI's IBM joint activities office.

While Roberts would not divulge any specifics of joint MCI/IBM development activities, the fact that the two companies are working together is encouraging. IBM has suffered financially of late, but its influence is great in the big business community that MCI must penetrate more effectively.

Roberts offered illuminating comments on the future of V-Net, MCI's virtual private network offering that competes with AT&T's Software-Defined Network. MCI will customize V-Net, he said, allowing users to design their own network trunking and numbering plans, among other things.

Also, he said MCI will expand its 800 services to incorporate greater flexibility in pricing and features, but again he would not elaborate further. MCI's 800 offerings, along with its WATS-type services, are a crucial component of its big business sales efforts and one that MCI lacked until too recently. Given AT&T's dominance, MCI's penetration of the 800 market will be slow and painful, but it's a step in the right direction.

At this point, MCI's plans regarding data networking are unclear, and Roberts did little to lift the veil of mystery surrounding the company's strategy. Roberts indicated a commitment to providing private data networking offerings of some sort, perhaps in conjunction with an equipment vendor.

To prosper, MCI needs to be more successful in data

See **MCI** page 10

Tellabs from **page 9**
network. As early as the 1970s, people were forecasting that data would soon comprise 50% of the traffic across the network. That still hasn't happened. We still have the advantage because voice still predominates."

Tellabs derives some 50% of its annual revenue from the sale of voice products. But Birck admitted the market for analog communications tools is showing flat growth. Therefore, he said, data products must contribute an increasingly larger share of the profits in the years to come.

Tellabs sells its DACS products primarily to the BOCs and independent telephone companies. In 1984, the company signed an agreement with AT&T under which the latter resells Tellabs T-1 multiplexers, statistical multiplexers and packet switches. For the most part, that agreement precludes Tellabs from selling those products directly to end users.

"Tellabs' data strategy relies heavily on AT&T, and I question whether that's a viable way to attack the market," said Gerald Mayfield, vice-president with DMW Group, Inc. in Stamford, Conn. "As important as T-1 is going to be, you have to ask if companies like AT&T and IBM are going to stand on the sidelines. I think AT&T is trying to develop T-1 products in-house."

Birck admitted Tellabs runs the risk that AT&T could develop a competitive product, but said Tellabs hedges its bets by working through other distributors like Northern Telecom and Bell Canada. Birck said those relationships are not as significant at this time.

Tellabs does maintain a direct sales force trained to target the end-user market, although the AT&T relationship places constraints on its activities at present. Mayfield said the Tellabs T-1 multiplexer would fare poorly in a head-to-head battle with more sophisticated products made by Cohesive Network Corp., Timeplex, Inc. and Network Equipment Technologies Co., because it still has only point-to-point capability.

Tellabs now has a networking multiplexer, called Crossnet, in beta testing. Birck said Crossnet will be available by late second quarter.

Clearly, Birck's vision of future networking is focused on the carriers: "I see a return to the more traditional provisioning of network services by the major carriers. The end user will be linked to public facilities through virtual networks. The emphasis on private networks will wane." Birck said he foresees BOC participation in inter-local access and transport area transmission, a move that will further promote the use of carrier services.

> "Tellabs' data strategy relies heavily on AT&T, and I question whether that's a viable way to attack the market," Gerald Mayfield said.

> Birck said he foresees BOC participation in inter-LATA transmission.

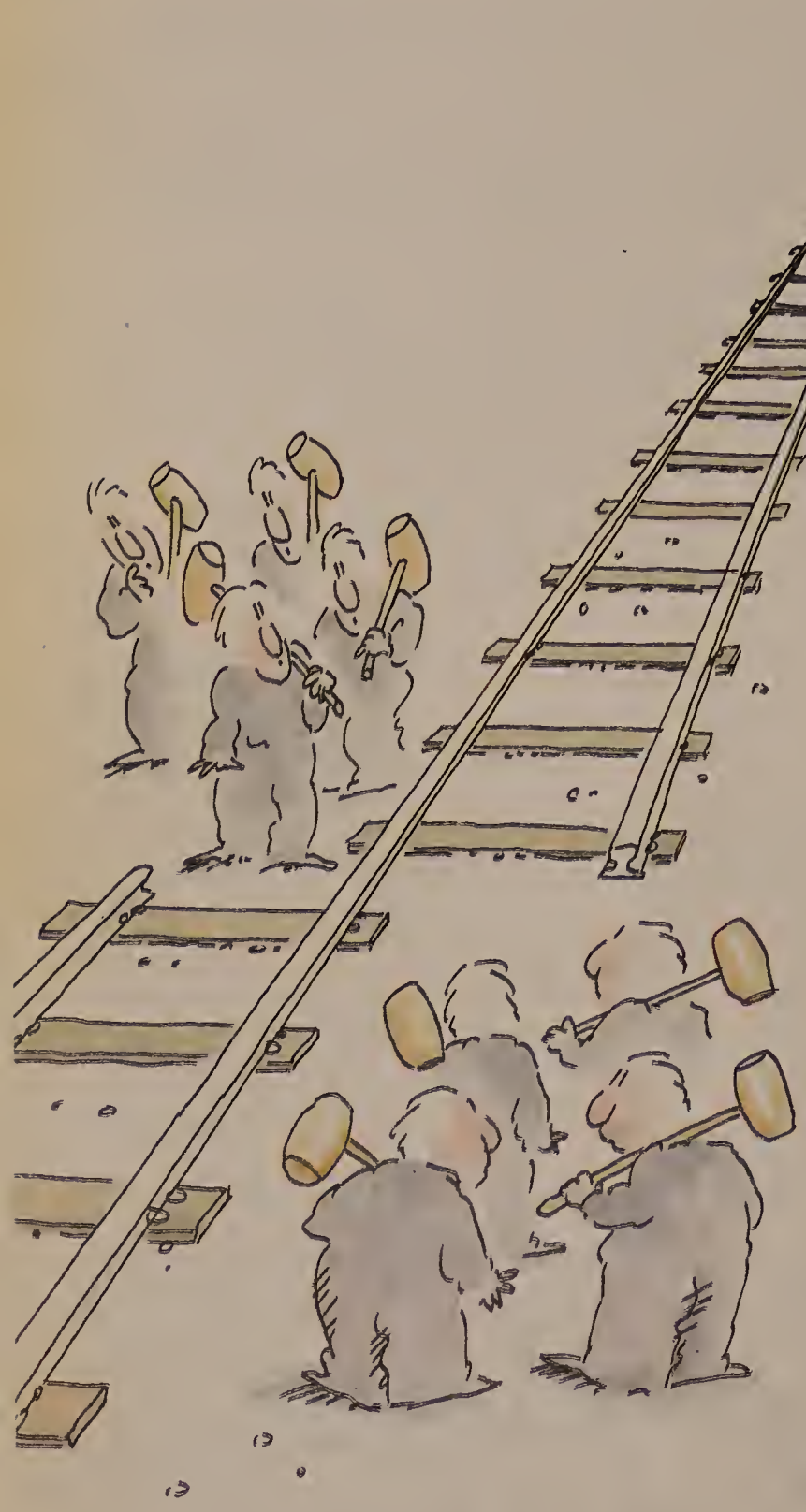
Despite potential pitfalls, Birck remains confident that Tellabs will maintain its profitable course. Alex. Brown and Sons, Inc., a Baltimore investment banking concern, evidently agrees. It recently recommended the company's stock, saying, "Tellabs will experience explosive growth, sparked by its products in the T-1 arena."

MCI from **page 9**
networking than it has been in the past. Datatransport, the company's public packet offering, was folded not long ago, and subsequent promises for a new private packet offering have yet to be fulfilled.

Roberts said the company is treading very cautiously in the packet-networking arena, given the untimely demise of Datatransport.

Analysts say MCI is well-run and that it is a long-term survivor. And Roberts said he is optimistic, despite the gloominess of the big picture.

But the challenge facing the carrier is to get big users to shift traffic onto its network, luring them through a comprehensive portfolio of voice and data networking services. How MCI intends to meet that challenge is not yet clear.



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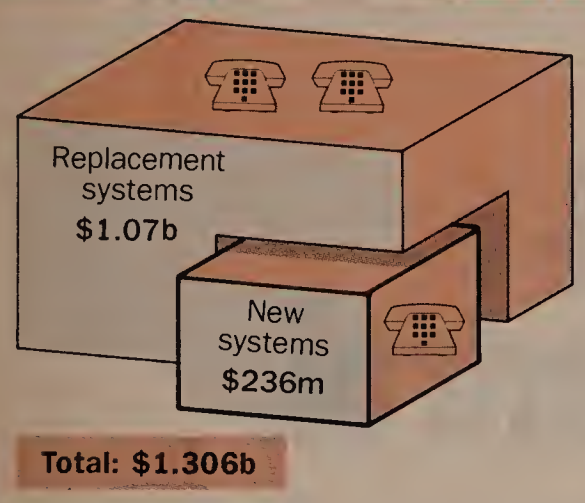
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Vice-president
AT&T's General Business Systems division

Value of key telephone systems shipped in 1986



SOURCE: FROST & SULLIVAN, INC., NEW YORK

PACKET SWITCHING SERVICE

Pacbell trapped in regulatory bind

BY MICHAEL FAHEY
Staff Writer

SAN FRANCISCO — Pacific Bell has been caught in a regulatory paradox that has gutted the carrier's incentive to introduce its proposed packet-switching service.

In November, the California Public Utilities Commission (CPUC) approved Pacific Bell's request to offer packet-switching services in the Los Angeles and San Francisco areas. The CPUC said, however, that since the venture was a speculative one, the carrier's shareholders, rather than the ratepayers, should assume the risk. The CPUC further said that, if the

See **Bind** page 14

FIBERNET

Buyouts boost network

BY JOSH GONZE
Staff Writer

METUCHEN, N.J. — FiberNet Communications Corp. recently concluded the acquisitions of three regional long-distance WATS reseller companies, the first step in the company's strategy to build a coast-to-coast fiber-optic network.

FiberNet, a publicly held company that began business last fall, plans to link customers of the three acquired companies within the next 90 to 120 days with fiber-optic facilities leased from Lightnet, Inc., Williams Telecommunications Co., MCI Communications Corp. and other fiber carriers. The nationwide network will eventually serve all cities along the leased routes, according to FiberNet Chairman Larry Stockett.

"We are leasing only digital fiber circuits from the local loop so that we can offer end-to-end digital service, typically to small customers," Stockett said.

FiberNet's strategy is to acquire WATS resellers, link them with leased fiber, then turn them into fiber resellers and use their customer bases and sales forces as a foundation for growth.

The three companies acquired were T.K. Communications, Inc., a WATS reseller leasing fiber from

See **Buyouts** page 14

MESSAGE STORAGE

RBHC eyes new service

Bell Atlantic seeks FCC approval.

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — Bell Atlantic Corp. recently became the first regional Bell holding company to seek Federal Communications Commission approval to offer an enhanced service — electronic message storage — without setting up a separate subsidiary.

As part of its FCC filing, Bell Atlantic outlined how it would comply with the agency's Comparably Efficient Interconnection (CEI) scheme, which requires the Bell operating companies and AT&T to provide enhanced service competitors with the same quality and cost of access to network facilities.

Bell Atlantic's message storage service would use the company's own central office equipment to store messages that would be accessed over the public switched network. The service is designed to allow users to provide recorded messages, such as weather reports, to callers.

A spokesman said competing vendors would need to purchase only a voice-grade access line to the central office and their own message storage equipment.

CEI rules state that the BOCs must separate all basic service elements that comprise the enhanced service and must make those elements available to competitors at

See **RBHC** page 14

CROSS TALK
BOB WALLACE

AT&T cultivates small and mid-size market

AT&T recently initiated a number of aggressive programs designed to fortify its already strong position in the small business communications equipment market by improving support and providing incentives to upgrade to larger systems.

Although these newly adopted plans run counter to industry speculation that AT&T may be preparing to sell off its General Business Systems (GBS) group, AT&T's strategy makes sense on paper. Profit margins of low-end systems are narrow but still there, and fostering customer loyalty pays dividends in future upgrade business.

The upgrade business is made all the more important by the fact that the private branch exchange market grows at 4% or less a year, and most revenue comes from the sale of upgrades and add-ons to existing systems. In that regard, the small business market is essentially a customer farm league.

AT&T began bolstering GBS, which serves the two-to-80-line key system and small PBX marketplace, roughly five months ago, when it started to transfer installation and maintenance personnel over from the Business Markets Group. The shift of 6,000 employees gives GBS its own dedicated service and support unit. ("AT&T shifts sales and service staff," *NW*, March 16.)

GBS, which boasts a 2,000-employee-strong national direct sales force, sells the System 25 PBX, all five models of the Merlin Communications Systems, several key telephone systems and a variety of computers. The market for these products represents about 95% of all businesses in the nation. The Business Markets Group sells AT&T's mid-size System 75 and high-end System 85 PBXs to mid- and large-sized corporations.

After transferring installation and maintenance personnel, AT&T introduced a program in January that provides customers renting low-end telephone systems with stable rates for at least 18 months.

The company also informed its rental customers they would receive up to 20% reductions in their monthly equipment fees if they signed two- or four-year equipment lease contracts for these voice communications systems.

And finally, in a move designed to encourage users renting or leasing its key telephone systems to upgrade to larger AT&T communications systems, the company introduced the America's Choice Bonus Program.

This scheme enables users renting AT&T's 1A Key and ComKey systems to amass credits toward the purchase of a Merlin Communications System or a System 25 PBX.

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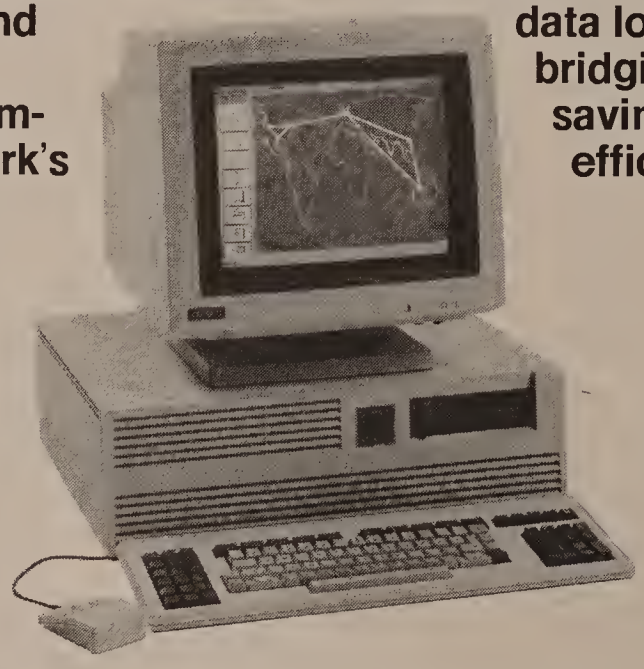
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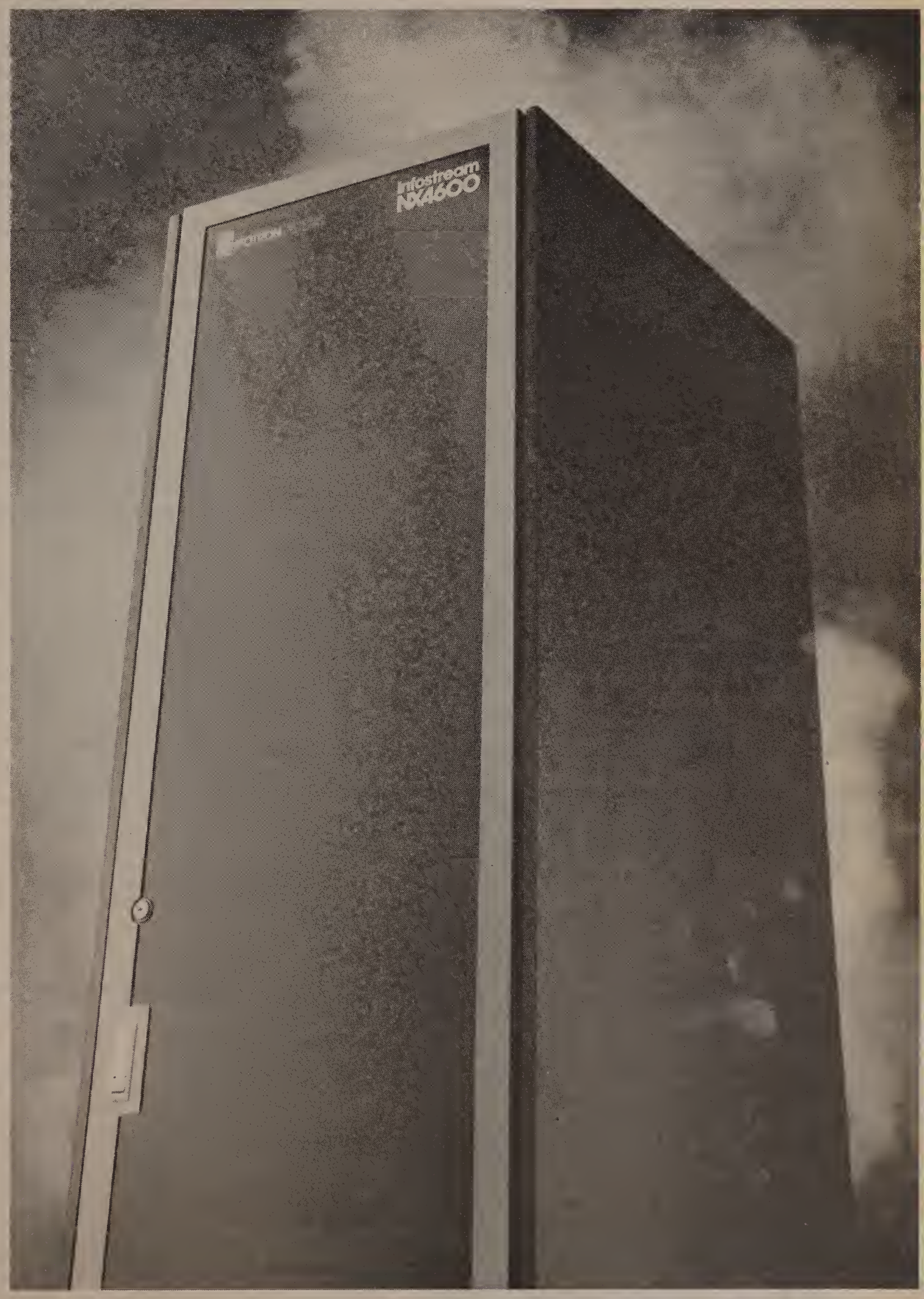
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Bind from **page 11**
packet venture was successful, Pacific Bell would be required to use the profits to subsidize regulated services.

Pacific Bell has appealed the decision, and the CPUC is expected to rule on the appeal this week.

Sources familiar with the case said that the initial CPUC ruling may have been influenced by Pacific Bell's failure to obtain necessary permission from the commission to test the packet-switching service.

The Pacific Bell service will compete with packet-switching offerings provided by nonregulated carriers such as Telenet Communications Corp. and Tymnet/McDonnell Douglas Network Systems, Inc. The packet services launched by other Bell operating companies have not yet proved profitable, analysts said.

A Pacific Bell spokesman said the carrier is appealing the decision because it puts the shareholders in the position of risking money without having an opportunity to make money. The spokesman said the carrier has not decided if it will go ahead with the offering if the CPUC does not decide in its favor.

It is difficult to predict how much effect the California decision will have on other state regulatory agencies, according to Paul Levy, chairman of the Massachusetts Department of Public Utilities. "Each state is trying to find its way in the face of competition," Levy said. "There are varying degrees of competition in the different states."

Levy said he did not believe, as a general rule, that telephone company shareholders should bear the risk of a venture unless they are also given the opportunity to profit if the venture turns out to be successful.

According to Page Montgomery, vice-president of Economics and Technology, Inc., a consulting firm located in Boston, many state regulators look to California when formulating their own state regulations.

He said that as the Bell operating companies continue to enter new areas of service, the issue of who will bear the risk and who will benefit from any profits will become increasingly important.

In addition, Montgomery said, state regulatory bodies and the Federal Communications Commission are closely examining ways in which shareholders and ratepayers assume the risks and benefits of communications services in light of AT&T's request for relief from rate-of-return regulations.

AT&T has asked the FCC to end rate-of-return regulations for its interstate long-distance service. "It is not clear exactly what AT&T will be looking for," Montgomery said. "They may want to cut their expenses and keep the savings. But, the whole issue of risk vs. benefits is going to be an important one."

If Pacific Bell goes ahead with the packet-switching offering as planned, it will provide intra-local access and transport area X.25 and X.25-to-X.75 packet-switching service to users in the San Francisco and Los Angeles areas.

Users wishing to transport data between the San Francisco and Los Angeles areas or elsewhere will have to transfer their traffic to another public packet-switching service such as Tymnet or Telenet using X.75 gateway services.

The carrier plans to use eight Northern Telecom, Inc. SL-10 packet switches within both the San Francisco and Los Angeles LATAs to provide the service, which the company said will allow users to send data at significantly lower prices than current dial-up data transmission offerings.

▶ COMSUMER CONTROVERSY

Regulators vote to increase line charges

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — The Federal-State Joint Board, a government regulatory agency, voted unanimously March 12 to increase the subscriber line charge (SLC) for small businesses and residential telephone customers by $1.50, bringing the total monthly charge to $3.50.

If the Federal Communications Commission also gives its approval, the SLC will increase $.60 on June 1, from the current $2 monthly charge. An additional $.60 will be added to the SLC on Sept. 1, 1988, and a tentative $.30 hike will go into effect on April 1, 1989, if the FCC and the Joint Board, which comprises state telephone regulators and FCC members, determine that the BOCs need to recover additional funds.

The FCC is almost certain to approve the proposal. The FCC and members of the National Exchange Carriers Association originally wanted the SLC increased by $4, but outraged consumer groups and pro-consumer members of Congress vowed to fight such an increase.

This proposal does not affect medium and large businesses that have multiple telephone lines. Large businesses have been charged $6 per line every month since the SLC program went into effect over a year ago.

The SLC is a result of divestiture and an attempt to move rates toward cost-based pricing. In the predivestiture era, local rates were kept artificially low, and local service was subsidized with profits from lucrative long-distance service. With the dissolution of the Bell System, the Bell operating companies were on their own, no longer receiving subsidies from AT&T.

Regulators and the local exchange industry decided the best way to achieve cost-based pricing was to charge customers directly for the cost of providing the physical links between the customer premises and the telephone company central office. The SLC represents the cost the local telephone companies incur to provide that local interconnection.

RBHC from **page 11**
the same price the BOC charges itself for those components. The BOC must also make known to competitors technical specifications regarding such things as software and interfaces used in the network to ensure equal quality interconnection to the service offering.

The only basic service required in connection with Bell Atlantic's enhanced service offering is a voice-grade business line, the spokesman said, which is already unbundled and offered under tariff. Bell Atlantic will comply with the FCC's new accounting rules in allocating joint and common costs associated with providing this service. It will also notify customers of their right to restrict access to their telephone service records to other vendors.

Bell Atlantic said it will use the experience in filing this CEI plan as a means of gauging future enhanced service filings with the FCC. This is not the first time Bell Atlantic has led the way into unchartered regulatory waters. Three years ago, Bell Atlantic was the first RBHC to ask the FCC for permission to offer protocol conversion and data transmission services through its New Jersey BOC, paving the way for the other RBHCs to follow.

The FCC will seek comments on Bell Atlantic's filing before deciding whether to approve the service.

Buyouts from **page 11**
Lightnet on the East Coast and operating under the trade name Toll-Kall; Advanced Communications Software, Inc., a California long-distance concern selling under the trade name Telephone Express Network and operating switches in San Francisco, Sacramento and Irvine, Calif.; and All-State Communications, Inc., providing WATS services in the San Francisco area.

Fibernet President Richard Kirkwood said the acquisitions mean his company can offer virtual WATS services over fiber-optic cable to the more than 10,000 small and medium-sized customers of the consolidated companies. FiberNet also plans to sell foreign exchange, private and T-1 lines.

Officials at FiberNet believe fiber's efficiency makes it possible to sell WATS-like services to small customers over a wide geographic area with fewer switching centers than have been required for long-distance transmission.

All three buyouts were accomplished through exchanges of FiberNet stock for stock of the acquired companies.

The first FiberNet connection will link the East and West Coasts in about four months, Stockett said. Thirty to 60 days later, according to Kirkwood, cities in the middle of the U.S. will begin to be connected with drop-and-insert facilities.

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LOCAL NETWORKING

The three Gs

"Guilt, gratitude and greatness" motivated Ethernet inventor and 3Com Corp. founder Bob Metcalfe to give the Massachusetts Institute of Technology $1.6 million to set up a professorship combining engineering and liberal arts. MIT, located in Cambridge, Mass., is Metcalfe's alma mater. The guilt and gratitude are his; the greatness is MIT's.

▶ NEW DOS

IBM holds the key

LAN vendors wait to move on operating systems.

BY MARY PETROSKY
West Coast Correspondent

Local-area network vendors are more interested in what IBM does with the next incarnation of MS-DOS than with the changes Microsoft Corp. is making to its personal computer operating system and its network software called Microsoft Networks.

Microsoft recently said it is working on a new version of MS-DOS, dubbed New DOS, that is designed to take advantage of expanded memory and other features of Intel Corp.'s 80286 and 80386 microprocessors.

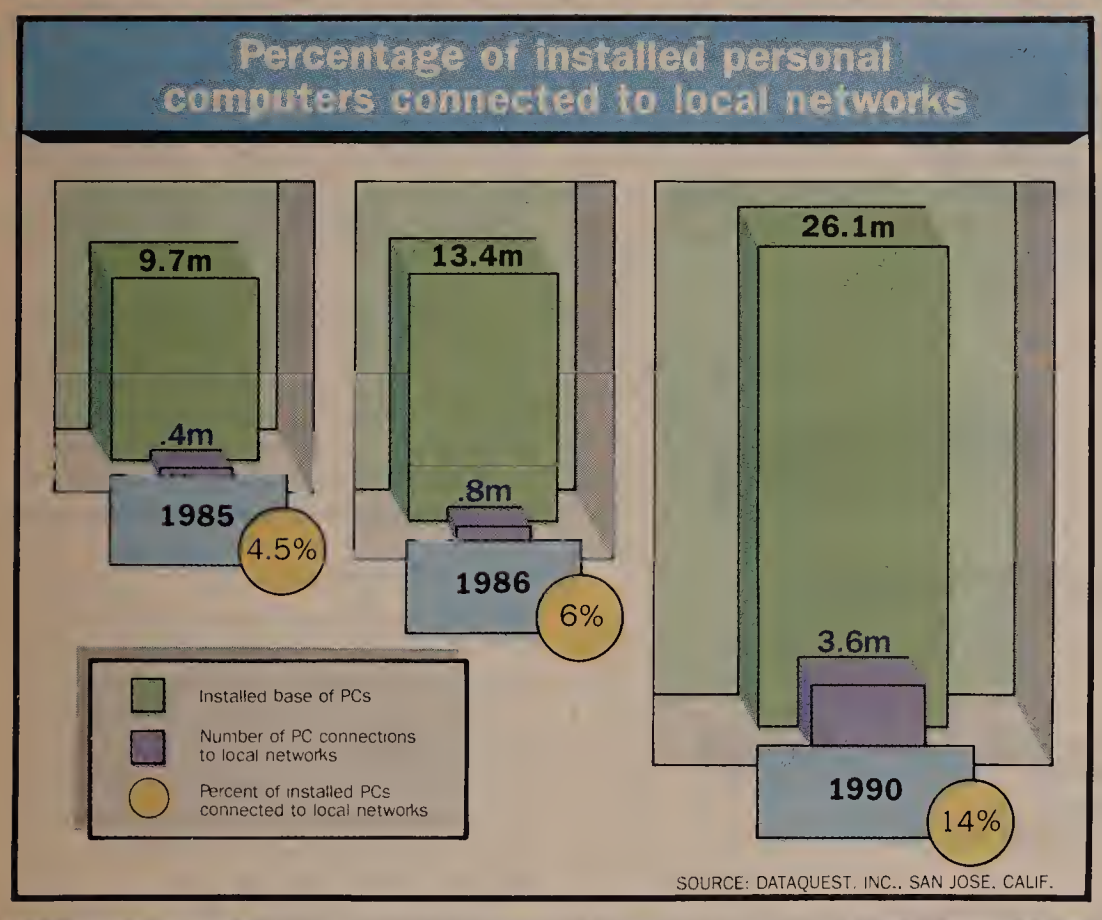
Unlike MS-DOS, New DOS will be multitasking, allowing several applications to execute simultaneously, and will be able to access 16M bytes of memory. The new version of the operating system will also support so-called interprocess communications between portions of distributed applications. Microsoft said it is developing New DOS because it cannot support needed enhancements in upcoming releases of MS-DOS.

Depending on how IBM implements New DOS, local network vendors such as 3Com Corp., Novell, Inc. and Banyan Systems, Inc. will have to make changes in their network operating systems, according to executives at these companies. Although these vendors maintain that such changes will have little effect on users, issues of compatibility between earlier versions of network operating systems and newer versions are likely to arise.

"At 3Com, we're in a turmoil over New DOS," said Bob Metcalfe, chairman, senior vice-president and general manager of the New Products Division. "Is Microsoft speaking on behalf of IBM or not? What IBM does is key. We try to be PC-DOS-compatible, not MS-DOS-compatible," Metcalfe said. An IBM spokeswoman would not comment on the company's plans.

Questions about IBM's direction, coupled with questions about how to take advantage of microcomputer hardware advances like the

See **New DOS** page 16



▶ ALLEN-BRADLEY

MAP 3.0 kit in the works

BY PAULA MUSICH
Senior Editor

ANN ARBOR, Mich. — Allen-Bradley Co.'s Communications Division, the factory networking arm of the firm, is expected to unveil a Manufacturing Automation Protocol 3.0-compatible starter kit next month at the International Programmable Controller Conference in Detroit, *Network World* has learned.

The kit, based on the unfinished release of the factory networking standard, is designed to allow users to experiment with the manufacturing messaging service (MMS) specification, one of the applications specified in MAP Version 3.0 that targets factory floor messaging.

The kit is designed to allow users to perform supervisory control, data acquisition and monitoring of a carrier-band 5M-bit/sec cell-controller network.

The starter package will include two Allen-Bradley Model PLP310 programmable controllers, network adapter boards, MAP software, network management software that runs on a personal computer, carrier-band cabling and rack-mounted I/O modules.

MAP software is loaded into the network adapters, and the boards

See **MAP 3.0** page 16

LANMARKS

ERIC H. KILLORIN

ISDN craze creates user confusion, not solution

The elusive game of predicting developments in Integrated Services Digital Network has regrettably given users much to ponder. Not since AT&T's Advanced Communications Service was supposed to have solved the communications problem of incompatible computers has the industry taken a concept and promoted it with such fervor. Time, however, would be better spent figuring out how to get a Digital Equipment Corp. VAX to talk to an IBM 4300 than recklessly suggesting that users think "all digital" or perish.

We don't really know what ISDN is, let alone what to tell users about how to plan for it. Today's ISDN craze is reminiscent of the early years of the local-area network industry, when the real beneficiaries were the hotels and seminar houses catering to travel-weary executives in search of answers that didn't exist. ISDN is not going to make the communications equipment we're using obsolete, just as personal computers didn't destroy the market for 3270 equipment. When minicomputer prices declined, the headlines read: "Death of the service bureau business." Hindsight is indeed 20/20.

The last thing users should be asked to worry about is end-to-end digital transmission. The concept itself is just dandy. So is the notion of 12 record albums in machine-readable bar code on the tip of a match head. Until viable products and services supporting ISDN are available, should we be leading users to believe that their investment in local nets today will be jeopardized by a concept scarcely past the dream stage? Should executives in the modem business have to justify their very existence?

AT&T has done much to promote ISDN with recent introductions of "ISDN-ready" phone sets and an "ISDN-compatible" upgrade to their System/85 private branch exchange. Here's a company that just introduced their first AT-compatible personal computer. And, here's a company with a sensible network called Starlan, that, for all we know, is taking a back seat to more press-worthy product introductions.

ISDN promoters should give users a break. Without users, there would be no local-area network industry to write about and no market in which to sell products. The ISDN

See **ISDN** page 16

Killorin is the publisher of "PC Netline," a newsletter on computer networks. He is also president of Hyatt Research Corp., a data communications market research firm based in Andover, Mass.

New DOS from **page 15**
80386 chip, are prompting 3Com to reevaluate its network operating system strategy. Among the options 3Com is considering is a shift back to Unix as the basis of its net operating system, Metcalfe said. "Unix does a lot of the things people want the New DOS to do," he said. "There's a race going on: Unix is coming down fast from larger systems, and IBM and Microsoft better hurry up with the New DOS, particularly the Intel 80386 version of it, if they hope to have a chance."

Currently, 3Com licenses Microsoft Networks but, like IBM, only uses the Redirector part of the network operating system, Metcalfe said. 3Com also uses the MS-DOS file structure and utilities, but the company has completely rewritten DOS' file system and protocols to create a multitasking network operating system, Metcalfe said.

Network vendors say that supporting the next version of the Redirector is likely to be key to compatibility with IBM. The Redirector intercepts I/O calls from MS-DOS and determines whether these calls are for locally attached devices or network-attached devices.

"Microsoft may require that you use their Redirector as part of New DOS," said Anand Jagannathan, vice-president of business development for Banyan. "That's something we are looking at, but we have a Redirector today that's a lot more functional for us because it's integrated into the way we do file service and management."

The Redirector is one of two programs and assorted network management utilities that make up Microsoft Networks, first released in November of 1984. Neither 3Com, Banyan nor Novell use any portion of the second program, the Server.

Vendors such as Hewlett-Packard Co. that use the Server software could benefit from the multitasking capabilities in New DOS. Because the Server is based on the current MS-DOS, HP is limited to a single-tasking operating system on its personal computer-based network servers.

Aside from conforming to the next version of the Redirector, vendors such as Novell and Banyan will probably have to make several other changes to their network operating systems.

"Microsoft is saying that the protected mode [in New DOS] is going to cause problems for companies like Novell who use a load-and-stay-resident shell to intercept calls to DOS," said Craig Burton, vice-president of corporate marketing and development for Novell.

It may take these companies such as 3Com and Novell some time to adapt to New DOS, according to Scott Haugdahl, senior systems specialist with Architecture Technology Corp., a Minneapolis-based consulting and publishing firm. Both Novell and Banyan use function calls and system interrupts in their operating systems that MS-DOS does not now use.

However, New DOS is likely to use function calls and interrupts that overlap with those now used by network vendors. Although vendors can resolve such conflicts by mapping New DOS calls to their operating systems, Haugdahl said that such changes may create compatibility problems with older versions of these operating systems.

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ISDN from **page 15**
craze will do little to aid users with their immediate communications needs. Let the technical societies work with suppliers and some of the more progressive user shops in defining sensible specifications for ISDN.

Sure, let's discuss it, write about it, participate in it and prognosticate all we will, but let's maintain good judgment when we position ISDN.

Whatever it is.

MAP 3.0 from **page 15**
plug into the programmable controllers. "From one PLP310, you can control the output of the other via MAP," said Steve Belisle, senior supervisor of MAP products.

"Users need to experiment with and understand MMS before they do a facilitywide implementation of MAP 3.0," Belisle said.

"The user application program in the programmable controller is very similar to programs for Allen-Bradley's proprietary nets, Data Highway and Data Highway II," he said. This will allow users to implement the starter kit without having to "relearn everything they know about factory floor communications."

There are more than 6,000 Data Highway networks installed. A price has not been determined for the kit, which Allen-Bradley hopes to ship in the first quarter of 1988.

The software in the kit will be the same as that to be used in a planned MAP 3.0 demonstration slated for June 1988 in Baltimore. If the specification should change before the demonstration, Allen-Bradley will offer an upgrade.

"We will be offering that so people can feel confident they will have a 3.0 implementation of the starter kit," Belisle said. Users will be charged for the upgrade.

DATA DELIVERY

Report details future of APPC protocol

Communications Solutions, Inc., a San Jose, Calif., software and consulting firm, recently published "Introduction to Advanced Program-to-Program Communications." The report explains what APPC is, examines how the protocol is currently being used and predicts its future importance. The report costs $295. For more information, call (408) 725-1568.

Users rate leading network management offerings

	Ease of use	Report generation	Overall reliability	Restoral capability	Traffic rerouting	Vendor support
IBM	3.0	2.6	3.9	3.1	2.7	3.7
Codex Corp.	3.6	3.0	3.9	3.6	2.7	3.4
Racal-Milgo, Inc.	3.6	2.0	4.2	3.5	2.2	4.1
General DataComm, Inc.	3.6	3.7	4.0	4.1	2.7	3.8
AT&T Information Systems	3.6	2.5	4.0	2.9	2.1	3.8
Paradyne Corp.	3.4	2.1	3.1	2.9	1.8	2.8
Atlantic Research Corp.	4.6	3.8	4.6	4.6	4.0	4.3
All others	3.8	3.3	3.9	3.6	3.1	3.5

The ratings are based on a 1 to 5 (low to high) scale.

The two areas rated lowest by users overall were traffic rerouting capability and report generation. Traffic rerouting, in particular, is becoming increasingly important with the expansion in size and complexity of user networks.

SOURCE: THE MARKET INFORMATION CENTER, INC., MARLBORO, MASS

X.25 CONNECTIONS

Varity satisfied with INS board

BY PAUL KORZENIOWSKI
Senior Editor

TORONTO — The first user of a personal computer adapter board that supports X.25 synchronous communications over dial-up lines gave the product high marks as the company took the first step in tying its international offices and distributors into a corporatewide network.

Three years ago, Varity Corp., which has its main office here and manufactures tractors and other heavy equipment, decided to link international remote offices and distributors to its data centers in Birmingham and Peterborough, En-

See **Varity** page 18

PROTOCOLS

ARC offers new line of analyzers

ALEXANDRIA, Va. — Atlantic Research Corp. unveiled a new line of protocol analyzers that are designed to work with a wide range of protocols and transmission speeds.

The Interview 7000 and Interview 7500 are based on microcomputers equipped with two 1.4M-byte disk drives, color monitor and graphics capabilities. The Interview 7500 features a 20M-byte hard disk drive that can be used to store data and test programs.

The testing products can monitor Systems Network Architecture, Binary Synchronous Communications, X.25, Open System Interconnect and International Passenger Airline Reservation System protocols. They can analyze protocols on lines transmitting at speeds from 256K to 1.54M bit/sec.

A library of application programs, "Application Resource Center," enables users to downline load protocol analysis programs. Users can run these test programs through either menu-driven interfaces, or they can develop their own versions of the programs by using an application programming language.

Each unit supplies statistical reports that can be used to track and document performance of various network components.

Pricing

Interview 7000 costs $14,995, and the Interview 7500 sells for $19,995.

DATA DIALOGUE
PAUL KORZENIOWSKI

CeBIT '87: Disneyland for computers

A Day at the Fair. Earlier this month, the city of Hannover, West Germany, hosted CeBIT '87, one of the world's largest trade shows. It is difficult to put the show into relative terms, but try to imagine Disneyworld filled with computer exhibits rather than rides and Donald and Mickey.

Some of the larger companies had as many as a half-dozen exhibits scattered throughout the 23 show halls and took great care to ensure they had sufficient personnel to greet the show's 350,000 attendees. Siemens AG and Nixdorf Computer AG each employed more than 1,000 workers in their booths, which were constantly mobbed with attendees.

The caliber of the attendees was said to be high, with some of Europe's most important industry and political figures spending a few days at the show.

A key difference between the fair and most U.S. trade shows is that many of the exhibits are permanent and are operated year-round.

Many vendors' booths were like small office buildings, two to four-stories tall. These booths had meeting rooms, lounges and snack bars so employees could entertain important clients or take a break during the 10-day show.

Given no credit. Despite the fact that it hosts one of the world's largest trade shows, Hannover is not an ideal location for such a conference. The city seems ill-prepared to handle the onslaught of more than 300,000 visitors.

Many of the local restaurants, including those affiliated with the city's largest hotels, do not accept credit cards. Most merchants and gasoline stations also do not take plastic, and some of the largest department stores had only one cashier who could authorize a credit card transaction.

One reason for spurning credit cards is high usage fees. One merchant said that Visa International, Inc. and Mastercard International, Inc. charge a merchant 5% of each purchase, American Express Co. charges 8% and Diners Club, 9%.

In the U.S., 2% of a purchase is the normal service charge. Credit-card suppliers may find themselves in a classic catch-22 situation. Because their European operating costs are high, suppliers are forced to charge merchants a high percentage for each transaction. If the suppliers could find new clients, they would be able to spread their operating costs out and lower the charges. But new clients are scared away by the high transaction cost.

Playing politics. Competition in Europe is not as open as it is in the U.S. In Europe, vendors compete with national governments as well as business competitors. Governments are always trying to make sure that their nation's vendors are protected, and powerful consortiums have been set up for just that purpose.

IBM has been trying to delicately maneuver around such consortia.

For example, the company has worked with the European Computer Manufacturers Association to get its LU 6.2 protocol incorporated into the International Standards Organization's Open Systems Interconnect model.

At CeBIT '86, IBM was a last-minute participant in a first-time X.400 demonstration. Some competitors were angry and felt that IBM's last-minute entry stole much of the demonstration's thunder.

As this year's demonstration was being planned, the group coordinating the demo placed new restrictions on vendors who wanted to participate. The group said all participating firms had to have an announced X.400 product — something IBM didn't have until a day before CeBIT '87 opened. So last fall, IBM dropped out of the group.

X.400 demo participants were once again unhappy with IBM, claiming the company deliberately tried to upstage their efforts.

At CeBIT '87, an IBM spokesman, who asked not to be named, said the rule changes were a political maneuver aimed

See **CeBIT '87** page 18

CeBIT '87 from **page 17**

at keeping Big Blue out of this year's demo.

Officially, IBM said the timing of the event prevented it from participating.

Living in the U.S.A. The melding of computers and communications is a European phenomenon as well as a U.S. trend.

Manufacturers such as Siemens and Nixdorf have comprehensive lines in Europe and both plan to augment their U.S. offerings.

Siemens already sells central office switches and some private branch exchanges in the U.S. The company said its high-end PBX and some of its computer products will soon be available here.

Nixdorf, best known for its departmental systems, has been selling a digital private branch exchange in Europe for more than four years and claims to have 10% of the German PBX market. That product may be added to its U.S. arsenal.

Das good deregulation? European companies are examining the issues involved in deregulating national telephone companies. Vendors were sharply divided on the likelihood of such moves. Some claimed that deregulation is imminent.

Others said that European markets are small and deregulation would hinder, not help, telephone service.

Varity from **page 17**

gland, running IBM 3090 mainframes.

Leased lines connect the company's sites in France, Italy, the U.S., Switzerland and Canada to its Systems Network Architecture network, but management had been unable to justify leased-line connections to smaller sites and distributors.

Instead, the distributors and small offices were using telephones, mail and telex services to track inventory, and those methods were proving inefficient. At the behest of upper management, Varity began searching for a way to link the other offices to the network inexpensively. The company saw immediate cost savings in linking distributors to the network and concentrated on solving that problem first.

Since leased lines were expensive, the company examined a number of dial-up alternatives including X.25 connections, dial-up WATS services and multiplexer solutions using IBM SNA protocols.

Varity determined that X.25 was the most efficient method for linking its other offices, according to Nick Weaver, manager of telecommunications planning and worldwide development at the company.

The conglomerate next examined a number of X.25 options, ranging from comprehensive private network services from vendors such as General Electric Information Services Co. to mixed public network and private offerings. After a thorough evaluation, Varity chose a mix of private network services and personal computers equipped with adapter boards and modems. "The combination of packet-switching services and personal computer communications boards provides us with the best cost performance and the most flexibility," Weaver said.

Packet services from GTE Telenet Communications Corp. in the U.S. and Datagram Corp. in Canada supply the distributors with access to Varity's SNA network. The companies have gateways between X.25 and SNA networks.

The distributors were equipped with personal computers, modems and a new communications board from Integrated Network Systems, Inc. (INS) in Mobile, Ala. The company's X.25 personal computer adapter supports IBM's Synchronous Data Link Control protocols over a dial-up packet-switching connection. "The INS communications package was the best one we evaluated," Weaver said.

The first phase in the plan was tying U.S. and Canadian distributors to the network. Many of these users were computer novices, so Varity wrote a front end that made the software easier to use.

About a year ago, Varity installed the first set of packages, including personal computers, application and communications software for its distributors. Weaver reported no major problems. "We ran into the problems normally associated with any new technology," he said. "But there were no major hiccups."

Thus far, 23 distributors have been tied into the network. The company has been satisfied with the INS product, but Weaver said he would like to see some added capabilities, such as internal modems and a version of the product that conforms to emerging CCITT X.32 standards for dial-up transmission.

Varity has aggressive plans for expanding its network. By the end of the year, 35 distributors will be tied into the network. Once that task is complete, the company will begin linking small remote offices to the network. "With the new products, we've laid the groundwork to meet the company's dial-up needs for the next five years," Weaver said.

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COMMUNICATIONS MANAGER

Understanding success

According to a survey conducted recently by Qualitative Marketing of San Jose, Calif., nearly 70% of high-technology companies cited a lack of understanding of their customer's businesses as a barrier to success.

NETWORK STRATEGIES

Microwave net spans desert

User overcomes mountains, climate.

BY BOB HAMEL
Senior Editor

HOUSTON — Building a microwave voice and data communications system is a challenging enough task under any circumstances. But when rugged mountains, desert terrain, extreme winds and haze are part and parcel of the site conditions, the job takes on nightmarish dimensions.

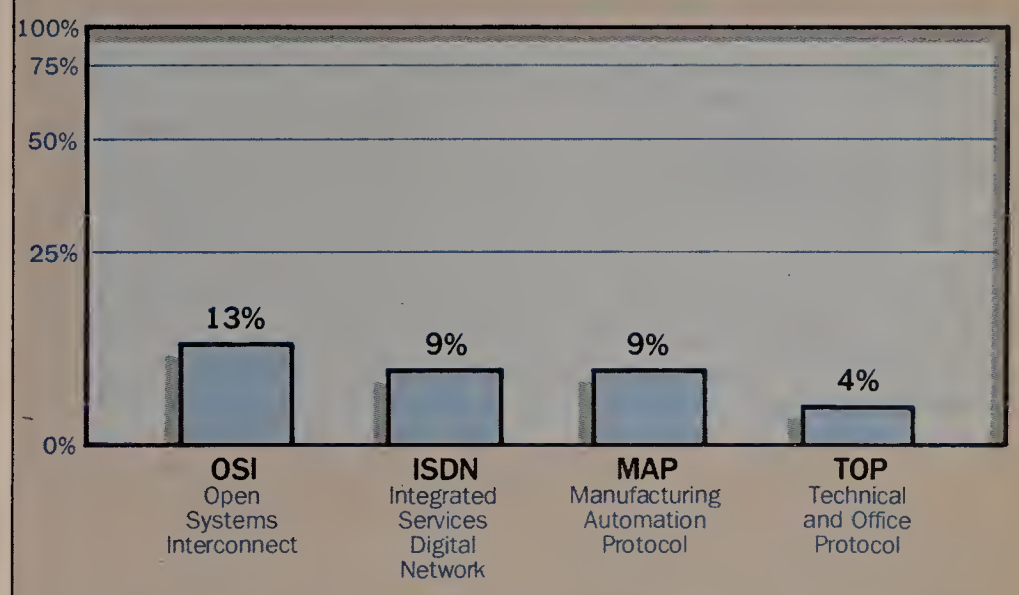
Despite those challenges, the Yemen Hunt Oil Co. installed in less than a year a microwave network that extends 431 kilometers, or approximately 267 miles, over the mountains and deserts of the Yemen Arab Republic. In a presentation at ENTELEC '87, the annual conference of the Energy Telecommunications and Electrical Association, members of the microwave net design team of Gillespie, Prudhon & Associates, Inc. and a representative of Yemen Hunt outlined the problems involved in implementing an advanced communications system where previously only mountain goats had traveled.

> The net handles voice and data transmissions along the company's route.

Yemen Hunt's microwave network, which cost $5 million to implement, runs along an oil pipeline being constructed by the company. Using 23 dish towers to relay information, the network handles voice transmissions between three pumping sta-

See **Desert** page 20

How users view their influence on standards



Percentage of Fortune 1,000 companies that believe they have affected standards development.

According to companies surveyed, users have little influence over standards-making, and vendors are too dominant in the process. Respondents said OSI was "important" to future networks, ISDN and MAP were "moderately important" and TOP was "not important."

SOURCE: FORRESTER RESEARCH, INC., CAMBRIDGE, MASS.

GUIDELINES

ERIC SCHMALL

A fool may talk, but a wise man speaks

Early in their careers, communications managers get numerous opportunities to develop effective writing skills. Procedures, memos and reports are the training grounds on which professionals refine their written communications skills. But writing skills alone will not carry a manager to greater organizational heights, nor will they enhance the organization's telecommunications resources.

To succeed, the manager must be able to communicate effectively in many ways. The manager must be able to stand in front of a group and deliver a concept, defend a view or convince a doubter. Proven speaking and writing abilities can work toward assuring the manager's success.

The ability to inform, persuade, motivate and inspire through public speaking remains absolutely crucial for translating ideas into actions. For all the wonders that written communications convey, people are more quickly moved by the spoken word.

From small, stark meeting rooms to richly paneled boardrooms, audiences wait to hear a qualified manager speak to the issues affecting communications. Users need instruction; senior management clamors for technological clarification of

See **Speak** page 20

Schmall is network systems manager for an insurance holding company.

TRAINING

BellSouth Educational Services offers courses

Technical, management topics covered.

BIRMINGHAM, Ala. — BellSouth Corp. said recently it will begin offering users a series of courses on topics in management and telecommunications technology.

The company said it is the first regional Bell holding company to publicly sponsor such courses, which will be run by BellSouth Educational Services, a newly formed division of BellSouth Services, Inc.

> BellSouth Educational Services is also willing to take its courses on the road.

According to Milt Hasty, assistant director of BellSouth Educational Services, the courses will cover such topics as fiber-optic network design, maintenance, line construction and digital technology, as well as general management subjects such as developing presentation skills.

Educational programs will be offered at BellSouth learning centers in nine Southeastern cities and will run from three to four days for management courses and between one and two weeks for more technical courses.

Hasty said the user courses are an outgrowth of BellSouth's employee training program, and the company is looking to them as an additional source of revenue.

Rodney Page, managing director of the educational unit, said the company is targeting the courses at "independent telephone companies and businesses that might not have the resources to provide their personnel with this type of training."

BellSouth Educational Services is also willing to take its courses on the road. If a business is not close to a learning center and has employees who want to take the training, the company will send trainers to the site. "We'll suitcase it on a case-by-case basis," Hasty said.

Although staffing for the centers has yet to be finalized, Hasty indicated that the centers are "ready to go now."

BellSouth Educational Services has been accredited by both the American Council of Education and the Southern Association of Colleges and Schools.

For more information, contact Hasty at (404) 321-8455.

ASSOCIATION WATCH

The Electronic Mail Association recently reelected Philip M. Walker, vice-president and regulatory counsel for US Sprint Communications Co.'s Telenet Communications Corp., to his second one-year term as association chairman. Joseph Norton, assistant vice-president of product development for Western Union Corp., was elected vice-chairman. Richard H. Miller, president of Telematics International, Inc., was named secretary of the association, and Douglas L. Brackbill, senior manager of marketing at MCI Communications Corp., was named treasurer.

Mr. Walker played a role in the passage of the 1986 Electronic Communications Privacy Act, which gives privacy protection to electronic messaging. Walker was the association's spokesman in congressional hearings and worked closely with the bill's authors.

Professionals in Telecommunications (PROTEL) will hold a meeting on the subject of bypass on April 1 at the Foster City Holiday Inn in Foster City, Calif. Cocktails will precede presentations on bypass and other telecommunications alternatives. Contact PROTEL's program director, Amy Bensman, at (408) 730-1233 for more information.

The North American Telecommunications Association said the second edition of its *Directory of Telecommunications Education and Training Programs* will be available April 1. According to NATA, a trade association representing more than 700 manufacturers, suppliers and users of telecommunications equipment, the directory is a source of information on where to recruit telecommunications professionals and where to obtain training for staff.

The directory lists schools and institutions that offer training programs, including professional development seminars and undergraduate and graduate degree programs. It also provides a list of associations and government organizations providing information on communications. The directory is priced at $14.95 for NATA members and $22.95 for non-members. For information, contact Mollie McOwen, (202) 296-9800.

The Communications Security Association will hold its second annual meeting Oct. 20 through 22 at the Sheraton Hotel and Exhibition Center in New Carrollton, Md. The group will also hold a membership meeting at the same site on Oct. 23. Among the topics to be discussed at the conference are the Electronic Communications Privacy Act and data encryption for secure communications. For more information, contact Shirley Henschel, conference coordinator, 9306 Wire Ave., Suite 701, Silver Spring, Md. 20901, (301) 588-3929.

The board of directors of the Computer & Communications Industry Association recently inaugurated new officers and elected new members to its Executive Committee.

Named as chairman of the association was Richard J. Schineller. Schineller is chairman and chief executive officer of Horsham, Pa.-based Decision Industries Corp. Named as vice-chairman was Jean M. Belhumeur Jr., who is currently chairman and president of Scan-Optics, Inc. of East Hartford, Conn.

Guy A. Daniello, president and chief executive officer of Datamedia Corp. of Nashua, N.H., will serve on this year's Executive Committee. Joining Daniello on the committee will be Stuart J. Miller, president and chief executive officer of Software AG of North America, Inc., in Reston, Va.; Ryal R. Poppa, chairman and president of Storage Technology Corp., of Louisville, Colo.; and Robert D. Smith, president of Stamford, Conn.-based ICL North America, Inc.

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Speak from **page 19**

products; decision-makers look for clues for the right direction among a confusing array of alternatives. These people haven't the time or patience to commission yet another white paper or read another series of reports. They need someone who will explain and clarify issues and someone who will also answer their questions effectively.

Public presentations will increase awareness not only of the issues but of the speaker as well. Through these sessions, a speaker introduces his ideas and himself to ever-widening circles of management.

While these occasions offer the potential for self-promotion and career advancement — with the possibility of rich rewards for a stellar performance — a poor showing can have disastrous effects.

A poorly written report is read, quickly filed and eventually forgotten. An ineptly prepared or delivered briefing, however, has significant staying power among the witnesses. With little effort, it is possible to cripple one's credibility permanently or eviscerate one's career in one quick conversational session.

To continue in the communications field, a manager must come to terms with the challenge of these opportunities. To seize them, the professional person needs to develop and sharpen presentation skills while keeping in mind the vast potential for success or failure.

He needs to understand there's no such thing as an unimportant or insignificant audience.

Desert from **page 19**

tions and two flow-control stations located along the pipeline and the company's headquarters in Suna, the nation's capital. The 23 microwave stations are powered by battery packs charged by solar energy. The network also transmits data on such things as oil flow from the pipeline stations. Currently, the system is carrying over 11,000 telephone calls a day and transmits data at 9.6K bit/sec.

Geographically, the pipeline originates in the central region of Yemen, and runs over a span of mountains thousands of feet high and then traverses a gradually flattening desert territory.

"Because of the terrain, we were required to design a system that follows the pipeline installation as much as possible," said Chris Gillespie, a principal with Gillespie, Prudhon. "Under these conditions, you have to have a system that is completely reliable. You just can't send a technician out in a car to check a fault."

To speed network installation, Gillespie researched equipment, while Gene Strid, an engineer with Gillespie Prudhon, conducted a field survey including selecting microwave-dish sites and checking wind, sun and haze conditions. Strid said the pains the design team took in choosing sites minimized the time needed to make microwave-dish placement corrections once implementation began.

The microwave stations are powered by solar batteries.

As the field survey was being completed, Gillespie finished the equipment request for proposal and sent it out for bid. Within three weeks, the company selected Farinon Transmission, a division of Harris Corp. based in San Carlos, Calif., to provide the microwave equipment.

Part of the difficulty involved in setting up the installations was that all parts and personnel had to be helicoptered to the sites. "In all, we flew over 3,000 helicopter lifts," said Dave Lerten, a Yemen Hunt spokesman.

Microwave towers were constructed in 30-ft segments and choppered out to the placement sites. All transmission gear and the electronic equipment governing the solar panels, batteries and alarm system were also airlifted in and constructed at each site.

Three hundred days after the planners sat down at their maps and drew the route, the company transmitted its first communications over the network.

"When you consider that it was only in 1964 that electricity and the automobile were introduced to the Yemen Arab Republic, you get an idea of what we faced in setting up the network," Strid said.

NEW PRODUCTS AND SERVICES

See inside for:
- ▶Speech-scrambling device
- ▶Configuration planning pack
- ▶Vocom system enhancements

▶CHANNEL EXTENSION

IBM channels linked with T-1

Ports monitored by net management.

BY JIM BROWN
New Products Editor

NEW HOPE, Minn. — Computer Network Technology Corp. recently unveiled a communications device that enables geographically dispersed IBM mainframes to be channel attached using T-1 digital transmission services.

The CHANNELink 5100/R can be used with 1.54M bit/sec T-1 links or 3.15M bit/sec T-1C digital facilities to connect IBM processors running MVS or VM, according to company President Mac Lewis.

Mainframe channels in the IBM environment operate at 1.5M or 3M byte/sec — equivalent to a maximum speed of 24M bit/sec — and are typically used to support high-speed communications with other mainframes, mass storage devices, printers and other peripherals.

The 5100/R supports the features of the firm's previously released CHANNELink 5100, which enables IBM mainframes to be channel attached at distances up to 4,000 ft.

Without aid of extension devices, channel-attached IBM hosts and other devices must normally be within 200 ft of each other.

The 5100/R is based on Motorola, Inc. 68000 microprocessors and appears to host processors as an IBM channel-to-channel adapter. It operates at the mainframe's block multiplexer channel speed of 3M byte/sec.

The device's internal software performs such networking functions as addressing, load leveling and dynamic alternate-path routing. Up to 64,000 virtual-control units can be addressed, Lewis said.

The 5100/R's internal memory, ranging in size from 2M bytes to 10M bytes, buffers data coming from the mainframe and passes it to the remote site either through a T-1 multiplexer or directly through a T-1 link via a modem.

A 5100/R on the receiving end determines if the message is destined for it, checks for errors in transmission and then buffers the data until it can be passed to the host channel at 24M bit/sec.

While buffering data, the 5100/R logically frees the mainframe channel for use by other applications. The process does not consume channel-processing time until the 5100/R has enough data to start communicating with the remote site at channel speeds.

The 5100/R is compatible and works with Computer Network Technology's network management package, the Network Curator.

The IBM Personal Computer-resident package provides a real-time network traffic display, enables managers to reconfigure channel-to-channel networks and features password protection that limits access to remote 5100/Rs.

That network management package can be used to access the 5100/R's suite of built-in diagnostics and to tap trace and error logs. The CHANNELink 5100/R's network management capabilities relieve the host of these responsibilities, Lewis said. Each 5100/R has two RS-232 ports, one of which can be used to connect to the network management package.

See **Link** page 25

▶CPE MANEUVERS

BellSouth to offer proprietary key set

BY MICHAEL FAHEY
Staff Writer

BellSouth Advanced Systems, Inc. recently introduced a key system designed to serve small businesses and branch locations of large users.

The System 30, which is manufactured by Sun Moon Star Group in Taiwan and distributed by BellSouth in English-speaking countries, can serve up to 10 outside lines and as many as 20 customer stations.

BellSouth Advanced Systems manages and directs the marketing activities of Southern Bell Telephone and Telegraph Co., as well as South Central Telephone Co. The distribution arrangement with Sun Moon Star marks the first time BellSouth Advanced Systems has had exclusive distribution rights for a product in the English-speaking world.

The software for the system is owned by Southstar Ventures, a joint venture between BellSouth Enterprises, the parent company of BellSouth Advanced Systems, and Sun Moon Star.

According to BellSouth Advanced Systems spokesman Ben Collins, the company believes the System 30's ability to redirect incoming calls to an outside number will be a major selling point.

"If a business wanted to provide 24-hour phone coverage, the system could be used to forward incoming calls after business hours to one central location," Collins said.

The system also allows calls to be forwarded or transferred to an outside number and the inside caller to leave the two outside parties during a conference call. The System 30's departmental calling feature allows users to provide backup for busy departments, Collins said. "Calls that ring in a specific department can be forwarded to an attendent," he said. "A sales department, for example, could transfer the calls to another location if it got busy."

The System 30 provides a fully nonblocking intercom feature allowing unlimited internal calling. Collins said competitive key systems allow a maximum of eight internal calls.

All stations of the System 30 are said to have built-in high-quality speakerphones. Additionally, stations have nine distinctive rings to help customers identify calling sources.

Other features include last-number redial and the ability to store up to 500 frequently called numbers.

The System 30 costs about $500 per station installed.

BellSouth Advanced Systems, Inc., Suite 850, 505 N. 20th St., Birmingham, Ala. 35203 (205) 226-3226.

▶CROSS-CONNECTS

T-1 DACS is versatile, compatible

DALLAS — Integrated Telecom Corp. recently announced a Digital Access and Cross-connect System (DACS) that provides basic DACS functions as well as voice compression, packet switching and network management.

The ACCUDAC 400 is also said to be compatible with the full range of T-1 telephone company transmission standards. This means that customers can use telephone company facilities as intermediate network locations capable of adding or deleting individual DS0 channels within a composite T-1 digital link.

DACS are typically used as hubs in private T-1 network environments to switch DS0 channels within incoming T-1 lines to DS0 channels available in outgoing T-1 links. T-1 digital facilities operate at 1.54M bit/sec and are composed of 24 DS0 channels, each of which operates at 64K bit/sec.

Besides this switching capability, Integrated Telecom's ACCUDAC 400 can be outfitted with line cards capable of supporting voice compression, X.25 switching and subrate data transmission. ACCUDAC supports up to 20 T-1 lines.

With the voice compression option, 64K bit/sec channels normally used to carry a single Pulse Code Modulated voice channel are resampled using Adaptive Differential Pulse Code Modulation (ADPCM). Two ADPCM conversations can use one DS0 channel.

A network management function enables customers to monitor all network end points from a central site and configure the network through software. The channel-routing maps stored in each DACS can be changed to enable customers to reconfigure the network according to net load.

The ACCUDAC 400 is fully compatible with telephone company T-1 standards at DS1, DS0, subrate and bundle levels, and can be used in private nets or to access telephone company service in hybrid networks, the company said.

A basic ACCUDAC 400 with two T-1 ports costs roughly $8,100. Additional T-1 ports cost $800 apiece. A fully configured box, supporting 20 T-1s, ranges in price from $35,000 to $40,000.

Integrated Telecom is located at 630 International Pkwy., Richardson, Texas 75081.



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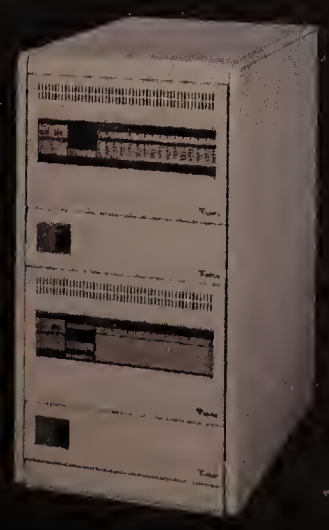
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Products & Services

Device scrambles human speech

A-O Electronics, Inc. announced a voice security device that scrambles human speech over cellular phones and other broadcast media, including two-way radio and satellite.

The voice encryption technology, which the company has dubbed **Multi-Dimensional Security System (MDSS),** scrambles speech in two ways: by jumbling the sound sequence and by inverting the frequency.

The product can be incorporated into various transmission devices, including digital nets. It can be used with most narrow-band VHF and UHF FM transceivers, the manufacturer said. MDSS is priced at $1,500 and will be available at the end of the third quarter.

A-O Electronics, Inc., 2137 Flintstone Drive, Tucker, Ga. 30084 (404) 491-8044.

Protocol-conversion products enhanced

Avatar Technologies, Inc. recently introduced new versions of its protocol-conversion products for connection of low-cost printers and terminals to IBM mainframes.

The **PA1500G Protocol Converter** uses Avatar's proprietary 3270 Gate Array Chip to allow any ASCII printer to be used in IBM 3270 applications.

It attaches to an IBM cluster controller via Type A coaxial cable to emulate an IBM 3287 or 3262 system printer.

A special "pass-through" port allows direct attachment of a personal computer to the PA1500G.

The product is compatible with IBM's Synchronous Data Link Control and Binary Synchronous Communications protocols.

The **PA1000G Protocol Converter** provides IBM 3278 Model 2 terminal emulation to allow the connection of ASCII terminals and personal computers to IBM mainframes. It connects to any IBM cluster controller via coaxial cable and allows local or remote attachment to IBM hosts.

When connected to an IBM Personal Computer or compatible, the PA1000G works in conjunction with Avatar's 3270 Emulation Software, providing a variety of features including file transfer, templating and data capture.

Combining the PA1000G and Avatar's RPA2000 Reverse Protocol Adapter allows the remote connection of IBM 3270 terminals to IBM hosts in several configurations. It also provides a local-area network interface.

The PA1000G is compatible with SDLC and BSC.

The PA1500G is priced at $1,295, and the PA1000G is priced at $995.

Avatar Technologies, Inc., 99 South St., Hopkinton, Mass. 01748 (617) 435-6872.

Configuration planning package bows

Simware, Inc. released software designed to help network managers maintain a centralized inventory of the IBM mainframe hardware and peripheral devices in their networks and plan network configuration changes.

The menu-driven **SIM/CONFIG** package runs on an IBM Personal Computer and produces schematic drawings showing the number, location and communications paths between CPUs, terminals, modems, printers, front-end processors, cluster controllers and other hardware typically found in large IBM networks. The package maintains a data base containing the specifications of about 500 of the most popular IBM and plug-compatible hardware devices as well as their connectivity rules. Users of the package select the manufacturer and model number for each hardware device they wish to add to the network. SIM/CONFIG's plotting algorithm then draws the cable connection between the ports.

The package will support multiple-configuration data bases, allowing users to define and display schematics of future networks or alternate systems. The package requires a hard disk and a personal computer with 512K bytes of random-access memory. Simware recommends the use of a color monitor.

A 20-year license for SIM/CONFIG costs $6,900.

Simware, Inc., 20 Colonnade Road, Ottawa, Ontario, Canada K2E 7M6 (613) 727-1779.

Vocom family enhancements announced

Perception Technology Corp. recently announced two enhancements to its Vocom family of interactive voice response systems.

The ability to support **Direct Inward Dialing** will enable the company's call processing systems to run multiple applications, each application using its own telephone number. Direct Inward Dialing will be standard on all Vocom systems shipped after March 1, and it will be available as an upgrade option to all installed Vocoms.

The company also announced an **Automatic Number Identification** feature that is intended to work in conjunction with future transmission services that, after automatically answering a call, identify the telephone number of the calling party. Information about the calling party could be passed on to a message accounting system.

Automatic Number Identification will be offered as an option to Perception's large end users and as

▶ MICOM WARES

Micom strengthens its modular multiplexer line

BY JOSH GONZE
Staff Writer

SIMI VALLEY, Calif. — Micom Systems, Inc. recently unveiled two new feature cartridges for its modular multiplexer, while its local-area network subsidiary, Micom-Interlan, Inc., announced products for VAX, MicroVAX and Ethernet networks.

Micom's new Featurepak cartridges enable the Micom Box Type 3 — a modular multiplexer whose use is determined by plug-in cartridges — to support simultaneous synchronous and asynchronous transmissions.

The Enhanced Synchronous Statistical Multiplexer (ESS) and the Enhanced Synchronous Wideband Multiplexer (ESW) cartridges combine up to eight synchronous channels or 16 asynchronous channels, or a combination of both, over a single composite link.

By combining synchronous and asynchronous channels over one line, the need for separate links is eliminated and transmission expenses are lowered. The ESS transmits over a single RS-232-C link, and the ESW transmits over a single V.35 wideband link.

With the ESS, asynchronous user ports are supported at speeds up to 9.6K bit/sec and synchronous ports at speeds up to 19.2K bit/sec. The externally clocked synchronous composite network link operates at speeds up to 19.2K bit/sec.

As a statistical multiplexer, the ESS's aggregate data speeds can be as much as four times greater than the composite speed. The aggregate of its asynchronous data speeds can be eight times the composite speed.

The ESS supports Micom's series of internal modems or Integral Service Unit (ISU) modules, which are Micom's internal channel/data service units used to interface with digital data services. These are the same modems and ISUs supported by the Micom Box Type 2 Enhanced Statistical Multiplexer.

The ESW provides the same synchronous channel support as the ESS, and its maximum asynchronous channel speeds are 19.2K bit/sec. Its composite network link speed can operate at 38.4K, 48K, 56K, 64K or 72K bit/sec. The ESW multiplexer hooks directly into AT&T's Dataphone Digital Service through use of an internal 56K bit/sec ISU module.

A four-channel model of the Micom Box Type 3 costs $1,790. Six-channel expansion cards, priced at $1,250, can increase the number of channels supported to 16. The ESS and ESW cartridges are $500 and $900, respectively. They are available immediately.

Micom-Interlan, the Micom local network subsidiary, recently updated a version of its Transmission Control Protocol/Internet Protocol networking software for use with its NP series of protocol processing boards used in Digital Equipment Corp. VAX and MicroVAX systems running VMS.

Version 1.1 reportedly raises TCP/IP performance 30% over earlier versions and includes new features that help programmers streamline development of networked applications.

Processing TCP/IP protocols does not affect the host's performance, according to the company, since those tasks are handled by the Micom-Interlan VAX Unibus or MicroVAX Qbus-compatible add-on board. The board also handles processing of the Department of Defense's Telnet protocol standard. Telnet support allows remote logon to any VMS host from any other host or terminal server running TCP/IP.

The Version 1.1 upgrade is free to current customers. A complete TCP/IP Ethernet connection for new customers costs $5,990 for VAX systems and $4,490 for MicroVAX systems. These prices include the appropriate protocol processor board, software license, software distribution kit, cables and documentation.

Micom-Interlan also recently introduced a multiport transceiver for Ethernet networks compliant with IEEE 802.3. The company said the product, dubbed the 8-4-1, provides the user with eight Ethernet transceivers in a single box.

The 8-4-1 allows up to eight Ethernet-compatible devices, either terminal servers, personal computers or minicomputers, to be linked in stand-alone or network-connected configurations. In a stand-alone mode, the 8-4-1 acts as a hub, enabling attached devices to communicate. The 8-4-1 switches between stand-alone and network-connected modes automatically.

Front-panel LEDs allow monitoring of the 8-4-1's operation, including status of each port, jabber and packet collision detection.

The 8-4-1 is priced at $995 and is expected to ship in the second quarter.

Micom-Interlan is located at 155 Swanson Road, Boxborough, Mass. 01719 (617) 263-9929, or (800) LAN-TALK.

Micom Systems, Inc. is located at 4100 Los Angeles Ave., P.O. Box 8100, Simi Valley, Calif. 93062 (805) 583-8600 or (800) MICOM US.

Products & Services

a standard feature to systems integrators and OEMs, but is dependent on the evolution of telephone company transmission services capable of passing that type of data on to end users.

The upgrades are available to users free of charge.

Perception Technology Corp., Shawmut Park, Canton, Mass. 02021 (617) 821-0320.

Two integrated phone/ facsimile machines out

Sharp Electronics Corp. recently introduced two integrated phone/ facsimile machines to replace Sharp's existing model FO-600 facsimile.

The **FO-640** features 12-second-per-page transmission, automatic error correction and a super-fine mode for sending documents with extra-fine resolution. The **FO-620** is a lower cost model that transmits at 15 seconds per page and does not have the automatic correction or super-fine mode features.

Both units have 16 halftone shades and automatic contrast control, which, according to the company, eliminates the need for sending test copies before transmission.

The units can store frequently called phone numbers and are equipped with a 16-digit two-line liquid crystal display for error messages and identification of terminal locations.

The FO-640 also offers the ability to insert documents and reserve transmission while the unit is receiving, as well as function buttons that can store multiple commands for one-touch operation.

The FO-640, for which pricing has not yet been set, will be available later this year. The FO-620 is priced at $2,695 and is available now.

Sharp Electronics Corp., Sharp Plaza, Mahwah, N.J. 07430 (201) 529-8950.

Emulex unwraps four new modems

Emulex Corp. introduced four new modems, including synchronous and asynchronous models.

The **HF144** and **HF96** half-duplex dial-up modems are designed for use in Group 3 facsimile machines with the added capability of Group 2 operation. The HF144 is a trellis-coded modem that operates at speeds up to 14.4K bit/sec and meets CCITT V.33, V.29, V.27ter and V.21 Channel 2 specifications. The product costs $355.

The HF96 operates at speeds up to 9.6K bit/sec and satisfies CCITT recommendations V.29, V.27ter and V.21 Channel 2. It costs $255.

The **HP144** and **HP96** are full-duplex leased-line modems that offer automatic adaptive equalization and programmable tone generation, as well as diagnostic and loop-back test capabilities.

The HP144 is CCITT V.33-compatible and operates at 14.4 bit/sec using eight-state trellis-coded modulation. It costs $700.

The HP96 offers CCITT V.29 and CCITT V.27 modes. It costs $365.

Emulex Corp., 3545 Harbor Blvd., P.O. Box 6725, Costa Mesa Calif. 92626 (714) 662-5600.

Software lets PCs access IBM hosts

ProtocomDevices, Inc. released software that permits IBM Personal Computers and compatibles to access IBM mainframe applications over any X.25 packet-switched network.

The program, called **Beanstlk/ 3270**, enables a personal computer to emulate an IBM 3278 display to support 3270 applications. Beanstlk/3270 is offered on a 5.25-in. diskette at $295 for one package, with the right to make two copies. It costs $75,000 for one package with license to make unlimited copies.

ProtocomDevices, Inc., Bathgate Industrial Park, 1666 Bathgate Ave., New York, N.Y. 10457 (212) 716-5400.

Link from **page 21**

With the network management package, managers can control network functions on any of the 5100/Rs in the network. Among those functions are network routing and addressing as well as the ability to update software in the units from one central location, perform network traces, execute diagnostics, receive network alarms and publish statistics on network usage and performance.

A single 5100/R equipped with 2M bytes of buffer memory and a single T-1 communications interface is priced at $35,000.

Computer Network Technology Corp. is located at 9440 Science Center Drive, New Hope, Minn. 55428 (612) 535-8111.

NETWORK WORLD

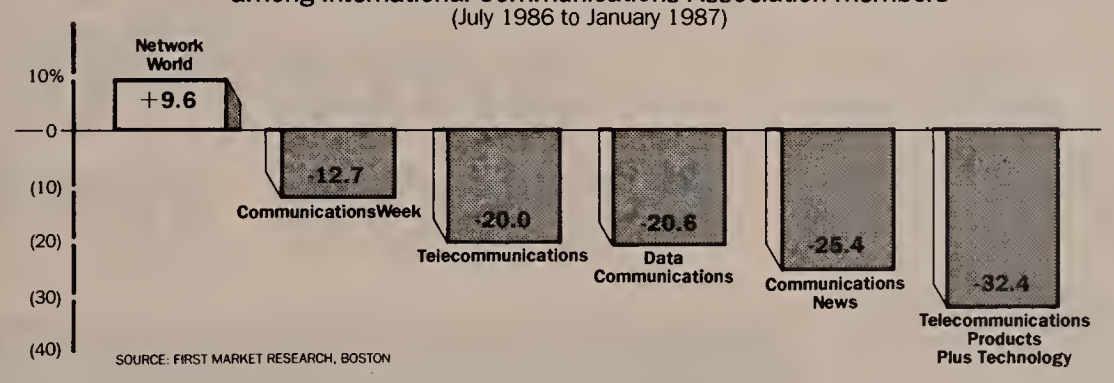
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February 23, 1987

Thanks for making us No. 1 in readership growth.

Thanks for making us the only publication growing in readership.

Percentage change in regular readership
among International Communications Association members
(July 1986 to January 1987)



SOURCE: FIRST MARKET RESEARCH, BOSTON

Dear ICA member,

It took you only 10 short months to endorse the concept of networking over the passing notion of plain old communications.

For most of you, networking means much more than just computers and communications. Networking is a business strategy. The goal: to link people and information for bottom-line benefits.

The shift to networking shows in your reading habits. In less than a year, you have embraced *Network World* in such large numbers that all our competitors are actually losing readers.

It's not that they haven't tried to imitate us. Our competitors are often our biggest followers. While imitation may be the sincerest form of flattery, no other publication matches the depth or scope of *Network World*'s networking coverage.

Thanks for giving us readership leadership. Thanks for making us No. 1.

Sincerely,
Bruce Hoard
Bruce Hoard
Editor

Opinions

THE ISSUE

Is fiber a threat to satellite-based nets?



PRO:

BY DON HUTCHINS
Special to Network World

Fiber optics has permanently changed the rules for choosing the best transmission technology for long-haul telecommunications. In fact, recent years have seen fiber optics become the best choice for almost all long-haul applications. Anticipated improvements in satellite technology can at best only guarantee it a diminished place in the long-distance telecommunications market.

When a new technology is introduced, it normally takes a while for it to be fully accepted and even longer for it to become the industry's dominant technology. Fiber optics, however, has already achieved both. After AT&T's divestiture in 1984, long-haul carriers began aggressively installing fiber optics in their networks. Three years later, fiber optics is the technology of choice.

Already it is undergoing rapid technological advancement. Single-mode fiber and dispersion-shifted fiber are examples of the improvements that will ensure fiber optics' continued dominance. And, when the optical switches now under development reach the marketplace, they will further increase the versatility and capacity of fiber systems, perhaps even allowing them to switch high-bandwidth video and data circuits.

Fiber-optic transmission is clearly superior to satellite in several key areas, including noise and delay reduction and elimination of electromagnetic interference. Atmospheric conditions such as heavy fog, rapid temperature change, lightning and heavy rain can directly affect satellite transmission quality. These conditions can result in higher noise levels, fading and even total signal loss. Interference can also result from other satellites or from nearby microwave radio facilities.

The overall quality differences between fiber-optic and satellite transmission become especially clear when comparing bit error rates, a measurement that is important to users of data or complex voice applications. On typical satellite links, the bit error rate averages 10^{-6} or 10^{-7}. The system level bit error rate for a fiber-optic link is approximately 10^{-14}.

Fiber-optic facilities also have far fewer signal propagation delays than satellite facilities. Such delays are common in satellite communications because present-day satellites are in geostationary orbit above the equator at an altitude of 22,300 miles. This distance alone creates a transmission delay of approximately one-fourth of a second. Echo cancelers can make this delay tolerable for some voice communications, but the resultant delay reduces throughput significantly for asynchronous data transmission.

Furthermore, when the overall communications distance exceeds the satellite's footprint, multiple hops are required. This creates further delay and affects the transmission quality.

Early single-mode fiber systems were built with electronics operating at rates of 45M, 90M or 135M bit/sec. More recent systems typically operate at rates of 405M or 565M bit/sec. And within the last few months, 810M bit/sec electronics have been deployed. Bit rates up to 2.4G bit/sec are currently being tested.

These developments mean the cost to add capacity to fiber-optic systems is minimal, and so is the

See **PRO** page 37

Hutchins is president of LDX NET, Inc. in St. Louis, Mo.

CON:

BY S.J. CAMPANELLA
Special to Network World

During the 22 years since the launch of the first commercial communications satellite, the Early Bird, satellite has come to dominate international communication for telephone and television signals.

Satellites are also the leading medium for distribution of domestic television transmissions. Satellite-based systems continue to grow because they deliver high-quality transmission at a lower cost than other media.

Fiber-optic cable, especially TAT-8, the undersea transatlantic cable expected to go into service in 1988, has captured the world's attention because it represents the only breakthrough in long-distance, land-based communications.

However, it is very expensive. A basic circuit over the TAT-8 fiber-optic undersea cable offers no cost advantage over equivalent satellite circuits. A low cost per circuit can be obtained with fiber-optic cable only when total capacity can be used efficiently — namely, between locations with heavy traffic.

Satellites, on the other hand, are competitive on all route types and win hands down on thin routes and for broadcast applications.

Fiber-optic proponents stress better signal quality, a largely spurious issue. It is extremely difficult to tell whether a transmission is made via cable or satellite. In fact, satellites are used to maintain the integrity of undersea cable systems and have frequently been used to restore communications after undersea cable outages.

Satellites are well-suited for the following:

- Point-to-multipoint transmissions.
- Geographically remote areas where it is uneconomical to place advanced cable systems.
- Private networks, with which significant savings can be achieved by bypassing the terrestrial system.
- Mobile communications, for which terrestrial systems are not practical or possible.
- Applications that would otherwise require long, expensive terrestrial links.

In the domestic communications arena, satellites are responding to terrestrial competition. Satellites offer point-to-multipoint capabilities and have the ability to share the capacity of the space segment by demand channel assignment among many small earth stations distributed within the coverage areas of the beams.

Domestic communications is shifting toward expanded use of small, low-cost earth stations for star and mesh-connected networks to provide data, videoconferencing and voice services on demand. This trend will soon extend to international services and domestic communications in the other nations.

The 15 operational satellites in the International Telecommunications Satellite Organization system are the result of five generations of continuously increased transmitted power, reception sensitivity and traffic capacity. The recent use of antenna beams to concentrate satellite power into high-traffic regions and the use of higher power satellite amplifiers have made possible the use of considerably smaller and less powerful earth stations.

Consequently, INTELSAT has

Campanella is vice-president and chief scientist for Comsat Laboratories in Washington, D.C.

Opinions

▶TELETOONS — By Phil Frank



ntroduced a wide spectrum of small antennas for accessing the system at both its C-band and Ku-band frequencies. These antennas are as small as 3.5M for Ku-band use and 4.5M for C-band use.

Satellites will play a major role n the worldwide growth of intelligent networks, especially those between remote locations and a central facility.

To meet this need and the growing demand for global digital communications, INTELSAT has introduced a variety of digital transmission systems, including International Business Satellite Services (IBSS), a closed-architecture system that supports international digital networks at bit rates up to 3M bit/sec using small earth terminals. Another INTELSAT system is the Intermediate Data Rate (IDR) service, an open-architecture system with rates as high as 45M bit/sec for international digital telephone services.

With these systems, digital telephone trunk service has already been offered that meets the Consultative Committee on International Telephony and Telegraphy recommendations for the worldwide Integrated Services Digital Network.

On the drawing board are satellite systems that will further improve performance and reduce costs. With spot beams, such satellites will allow the widespread use of smaller earth stations on or near the users' premises.

Where traffic is thinly distributed, the spot beams will hop to various locations to aggregate sufficient traffic to fill the beam efficiently. A telephone switch will be on board the satellite to direct each call to the appropriate beam and then to its destination.

Satellites can be significantly more cost-effective and more efficient than fiber because they can bypass and eliminate many interconnecting terrestrial lines and tandem switches that constitute the current network. Because terrestrial facilities currently account for about 90% of the cost of an overseas telephone call, future satellite use would result in dramatic cost reductions.

Satellites can provide new and improved capabilities and services, exploiting their inherent multiple access/multiple destination properties to bypass expensive terrestrial and submarine cable facilities.

Satellite transmission and processing techniques will be vigorously competitive well into the next century.

INTEROPERABILITY

STEVEN THOMAS

Vendors get no respect

In a column entitled "The Pillage of OSI" (*NW*, March 2), Jeff Horn of Network Strategies, Inc. laments the misuse of Open Systems Interconnect protocols by vendors and users.

When vendors misuse OSI in order to mislead users, such criticism is appropriate and justified. It is an error, however, to extend this attack to those vendors who are truly serving the needs of network users.

Vendor deception is admittedly a serious problem. OSI and OSI protocols have become the latest local network buzzwords, and several vendors are trying to cash in on their popularity by giving non-OSI products the appearance of OSI compatibility.

It's from vendors such as these that we have a "TOPS network" that has nothing to do with Boeing Computer Services Co.'s OSI-based Technical and Office Protocol suite and "MHS" electronic mail software, whose conformance to OSI's Message Handling Services protocol (also known as CCITT X.400) goes no further than its name.

Vendors also mislead users by adding minimal OSI compatibility to a non-OSI product just so they can ride the OSI bandwagon. Vendors who deceive and confuse users in these ways cheapen OSI and deserve criticism.

Some offer OSI solutions

Fortunately, not all vendors want to stick an OSI label on their products just to make more sales. Some vendors not only offer true OSI solutions, they also provide ways for users to add OSI compatibility to a predominantly non-OSI world. These vendors are not misleading users; they're solving users' problems.

Some users fear, for example, that the addition of IBM's Network Basic I/O System interface to an OSI product will result in an "OSI product" that isn't really OSI. Such concerns are ill-founded. When it's done correctly, the NETBIOS interface can be added to an OSI product without sacrificing that product's OSI compatibility in any way.

For example, Communication Machinery Corp.'s NETBIOS-OSI interface is a true interface, not an additional protocol.

Applications on an MS-DOS personal computer — such as FTAM and Virtual Terminal — can use the NETBIOS interface to communicate with remote Unix, VMS and Xenix systems that have no conception of NETBIOS.

Furthermore, standard PC Network applications such as IBM's PC LAN Program function normally on the network.

Filling a need

This approach would remain nothing more than a technically clever curiosity except for the fact that it clearly satisfies users' needs.

Most users are unable to convert suddenly to a complete OSI network, either because the OSI applications they require are not available yet or because they must preserve their investment in current products.

For example, an MIS manager who purchases several copies of Ashton-Tate's dBase III+ does so because he needs the features of that product.

Currently, no pure OSI network can satisfy those needs. An OSI network with a NETBIOS interface can, however, support dBase III+ and OSI applications at the same time. And when the International Standards Organization develops an application protocol with equivalent functionality, that application can be simply and inexpensively added to the OSI network already in place.

Network vendors who take this approach start with a complete OSI solution and carefully expand it to incorporate non-OSI products. These vendors are not "pillaging" OSI.

They are, instead, providing users with OSI networks that preserve the users' current investments and allow them to augment OSI with other applications for which there is no OSI equivalent.

In fact, by letting users migrate gracefully to full OSI networks, these vendors are promoting OSI and giving it its only practical opportunity to become widely accepted.

OSI promises universal interoperability, but only after users accept and install OSI networks will it deliver on that promise.

Thomas is a principal engineer at Communication Machinery Corp. in Tempe, Ariz.

NETWORK WORLD

Features
March 23, 1987

Northern Telecom's Richard Greco



BY MICHAEL FAHEY
Staff Writer

When Richard Greco moved from Philadelphia to Washington, D.C. to take a sales job with Northern Telecom, Inc., he stayed at a Holiday Inn while hunting for an apartment. By the time he found one, the hotel had a new phone system, and Northern Telecom had a new customer.

"I knew the hotel needed a new system as soon as I tried to make a phone call. The phones were terrible. I couldn't get an outside line," says Greco, who sold $750,000 worth of equipment during his first six months with Northern Telecom. During his second year with the company, Greco racked up more than $2 million in sales before becoming, at age 27, Northern

☞ See **Greco** page 30



WALTER P. CALLAHAN PHOTO © 1987

Greco from **page 28**
Telecom's youngest district sales manager.

Greco is a super salesman.

From the streets of South Philadelphia, where he hawked pretzels as a kid, to the hinterlands of Western Pennsylvania, where he sold insurance to pay his college tuition, and now as sales manager responsible for the crucial Washington, D.C.-area telecommunications market, Greco knows how to move the product.

When he went to work for Northern Telecom in 1982, the Integrated Office Systems Group, located in Vienna, Va., had 18 employees and only 12 installed systems. Today, the office in Vienna, a suburb of Washington, has 200 employees and 300 telephone systems installed at user locations in the D.C. area.

The right stuff

Greco attributes his group's success to a good product, talented staff and hard work. "The real key to success is just hard work," Greco says. "It's hard to explain, but you can tell if someone has the desire to be a good salesman just by talking to him."

His boss, Harry Gowl, agrees, and says Greco himself exhibited those qualities in his initial interview. "When I hire, I look for young people who are bright and want to make money," says Gowl, general manager of sales for Northern Telecom's Mid-Atlantic region. "I'm not interested in a guy who wants a title or security." A top-notch salesman, one who "does everything right," Gowl says, can earn a six-figure salary by the time he is in his second year with Northern Telecom.

In addition to exhibiting a willingness to work hard and a desire to make money, Greco had another

> "I look for someone who has been out there banging heads," says Harry Gowl, general manager of sales.

quality Gowl considered a plus: He was an experienced communications equipment salesman. After graduating from Pennsylvania State University with a degree in accounting, Greco went to work for ITT Corp., first selling paging systems used by automobile dealers and then selling key systems. After 11 months on the job, he became a sales manager.

Greco left ITT to join General Telecom Co. and sold large private branch exchanges in the Philadelphia area for 1½ years.

"I look for someone who has been out there banging heads," Gowl says. "Maybe he was selling key systems and is looking to make some big numbers."

Having as sharp an eye for the main chance as for a prospective sale, Greco became interested in Northern Telecom almost as soon as he began selling telecommunications equipment. In typical fashion, the hardworking son of a Philadelphia detective contacted the company repeatedly until he was granted an interview and a chance to sell himself. He succeeded, and, once hired in July 1982, Greco began selling Northern Telecom equipment like a man possessed.

> "Some consultants are good, and some are bad," Greco says. "Many consultants have biases, and you would be surprised at how many consultants are just inept."

"I was bent on succeeding, and nothing was going to stop me," says Greco, who reads psychology and motivational texts to improve his sales and management techniques.

Although he claims to have modified his hard-driving pace somewhat, Greco says he still "eats, drinks and sleeps phones and winning deals.

"When I watch a movie or TV I notice the telephone, what brands they are," he says, laughing at his own zeal. Warming to the subject of deals, sales and telephones, Greco turns to one of the huge windows that span two walls of his ninth-floor corner office and gestures toward the fast-growing business district of Vienna.

"The principal reason people around here buy systems is that they are moving to new locations and it seems like a good time to update the old communications system," Greco says. "When I see new buildings, I see new telephone equipment."

Such single-mindedness is necessary in the highly competitive world of sales, and it is particularly necessary in telephone equipment sales.

"I'm sure guys in the insurance industry would give me a fight on this, but I think this is the toughest sales game going right now," Gowl says. "There is a lot of product dumping going on, so many people are trying to buy their way into the market."

Ironically, one of Northern Telecom's most formidable opponents in the crowded telecommunications equipment market helped boost Northern Telecom's sales, according to Greco. "When IBM bought Rolm, they blessed the PBX as a data transmission vehicle," Greco says. "That's something we've been saying for years. We've been transferring data at 2.5M bit/sec on twisted-pair wiring and people were not listening to us."

Today, Northern Telecom PBXs' biggest selling point is their dual quality as voice and data switches. Greco says, "We are getting a lot more respect." Another important selling point, according to Greco, is what he describes as Northern Telecom's strategy of evolving rather than suddenly changing its products, thereby allowing users to upgrade their old telecommunications operations without scrapping their old equipment.

Northern Telecom's high-quality service and maintenance also boost sales, Greco says.

"When a decision is made on price alone, frankly, we usually lose the sale," he says, adding that while users are becoming more sophisticated about telecommunications equipment purchases, buying decisions can still hinge on something as trivial as the equipment's color.

The users with whom Northern Telecom's sales staff meets have a wide variety of job titles and functions. In some cases, Greco says, the salespeople deal directly with someone from the data processing department. At other times, the telecommunications manager is the contact person for the user organization. Users sometimes form a committee and, in some instances, Greco says, he deals directly with the switchboard operator.

> Greco agrees that the communications industry is exciting and always changing, but adds, "The only trouble with sales is you make a lot of money, but get no respect."

This reflects an industrywide problem, Greco says. "Corporations do not value their communications and information networks the way they should.

"The result is that the corporations that do invest money in an information network are going to win," Greco predicts. "Information networks today are the heart of the business, and if you have a communications network, you are going to have an advantage over your rivals."

According to Greco, as corporations invest in new communications networks they should consider hiring a chief information officer. "I think this is a specialized industry," he says. "Corporations are spending billions of dollars more than they should because they are not effectively managing their networks."

Both Greco and his boss, Gowl, agree that, while senior management generally has the final say on major telecommunications purchases, it is important not to bypass the telecommunications manager or other technically oriented user employees. "The telecommunications manager is usually a recommender, not a decision maker," said Gowl. "But, you can cause yourself a lot of trouble if you try to go over his head."

Biased consultants

In the course of his work as a salesman, and now as a sales manager, Greco has had countless dealings with consultants.

"Some of them are good, and some are bad," he says. "Many consultants have biases, and you would be surprised at how many consultants are just inept, at least in this town."

In one instance, recalls Greco, a potential customer with whom he was working closely was told by a consultant that Northern Telecom equipment could not handle data communications. Greco was able to convince the customer that data communications is one of the Northern Telecom's strong points, but the consultant's off-base recommendation did not do much for Greco's view of the profession.

Greco described the request-for-proposal process as difficult and time-consuming for telecommunications equipment vendors, but, he says, RFPs are generally worthwhile for users. He warned against having a salesman from an equipment vendor draw up an RFP, since it could well end up describing a system strikingly similar to the one being sold by the RFP's author.

While he says he currently does not put together RFPs for users, Greco admits that he did so in the past. Now, he says, a Washington, D.C.-based consultant is claiming one of Greco's RFPs as the consultant's own work.

A 31-year-old father of two, Greco recently won a trip to Spain and Italy for his performance as a sales manager. Although he is pleased at the prospect of spending two weeks in Europe, the intensely competitive Greco is convincing when he says winning the competition and being recognized for his performance is more important than earning the free trip.

As he shows a visitor to the lobby, Greco agrees that the communications industry is exciting and always changing. Then, just before the elevator door closes behind him he adds, "The only trouble with sales is you make a lot of money, but get no respect."

COMMUNICATIONS SOFTWARE

High-caliber connections

SNA users are sending 3270 SNA/SDLC traffic across X.25 nets.

Continued from page 1

BSC and IBM 3270 Systems Network Architecture/Synchronous Data Link Control. These PADs perform protocol conversion between synchronous protocols and X.25.

One of the most requested X.25 synchronous interfaces is IBM's 3270 SNA/SDLC cluster controller. Users of both public data networks (PDN) and private packet nets want to send 3270 SNA/SDLC traffic across X.25 networks.

The leading PDNs, Telenet Communications Corp.'s Telenet and Tymnet/McDonnell Douglas Network Systems, Inc.'s Tymnet, offer a variety of SNA-to-X.25 protocol conversion services. In addition, many packet-switch vendors have developed 3270 SNA/SDLC PADs to perform protocol conversion in private networks. These vendors include Amdahl Corp., BBN Communications Corp., Dynatech Packet Technology, Inc., Protocom Devices, Inc., Telenet, Tymnet and XMIT AG.

The two dominant approaches to SNA-to-X.25 protocol conversion are the SDLC pipe method and the value-added method. The SDLC pipe approach provides an SDLC transmission medium, or pipe, which passes higher level SNA protocols (above the data link layer) transparently through the X.25 network. The value-added approach provides additional capabilities not available with the SDLC pipe approach.

The SDLC pipe

An SDLC pipe provides 3270 SNA/SDLC-to-X.25 protocol conversion by emulating SNA's data link control layer (see Figure 1, Page 32). A typical configuration comprises a terminal PAD and host PAD. The terminal PAD intercepts SDLC frames, strips off the header and trailer and inserts the remainder into an X.25 packet. The host PAD puts back the SDLC frame header and trailer at the receiving end.

☞ See **Connections** page 32



RICH TENNANT ILLUSTRATION © 1987

Chartoff is a senior consultant at Network Strategies, Inc., a communications consulting firm in Fairfax, Va.

Connections from **page 31**

The higher layer SNA information in the path information unit (PIU) is unaffected.

A separate virtual circuit is established for each secondary station or physical unit attached to the terminal PAD. All displays and printers or logical units attached to a secondary station use the same virtual circuit.

The SDLC pipe requires a protocol to distinguish between SDLC control commands and responses that are passed from PAD to PAD across the X.25 network, and normal X.25 data packets that contain SNA PIUs. This logical link control protocol can be a Physical Services Header (PSH) protocol, a Qualified Logical Link Control (QLLC) protocol or a vendor proprietary protocol.

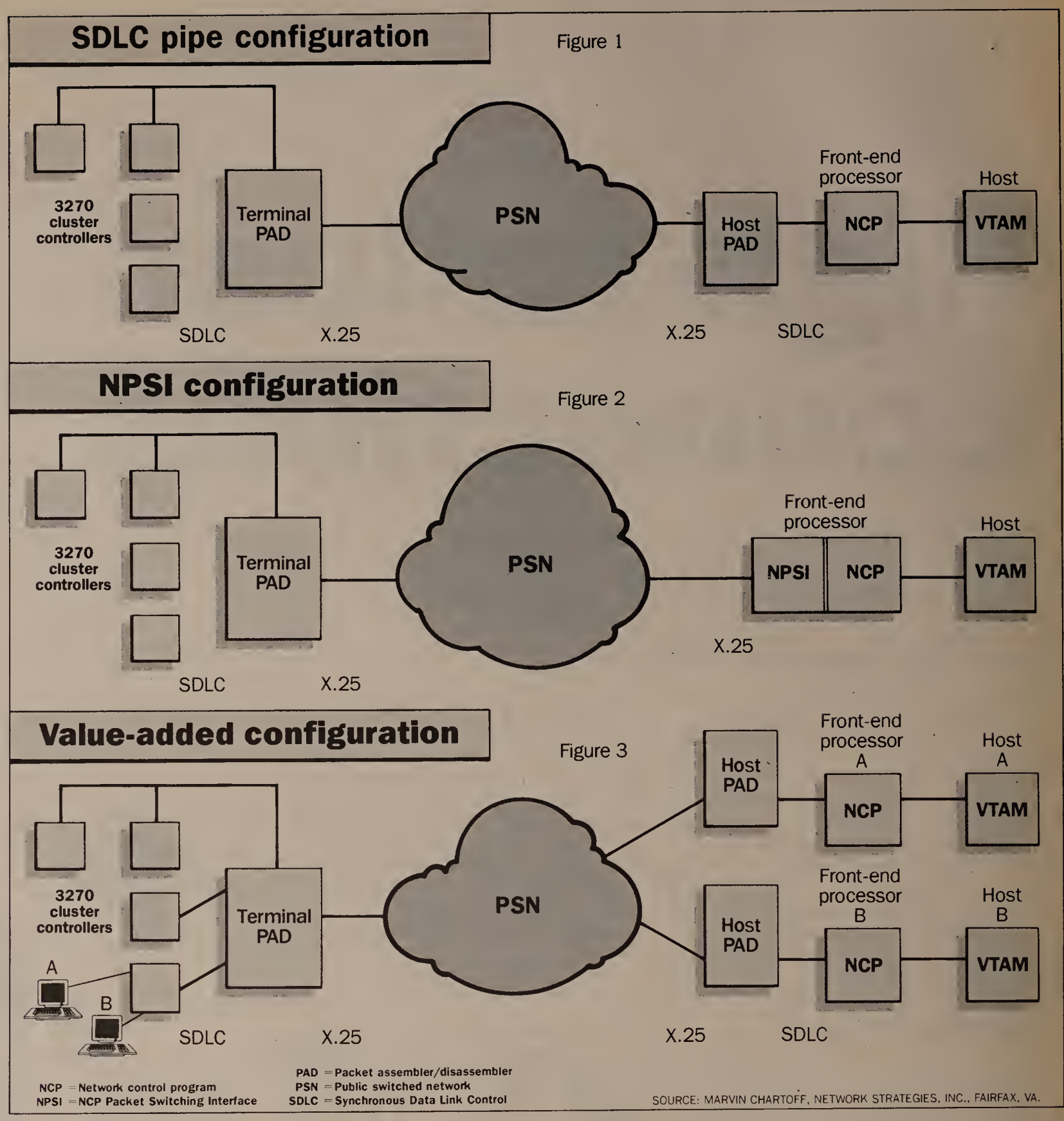
IBM uses the PSH protocol in its 5973 Network Interface Adapter, which is similar to a terminal PAD. The PSH protocol uses a two-byte Physical Services Header that indicates the presence of SDLC commands and responses in an X.25 packet. Some vendors have implemented PSH in their PADs. However, QLLC is replacing PSH as the preferred logical link control protocol in IBM's newer SNA/X.25 products.

IBM has implemented QLLC in many products, including newer versions of the network control program (NCP) Packet Switching Interface (NPSI), which runs in a 3705 or 3725 front-end processor. NPSI provides an X.25 interface to a packet-switched network and converts X.25 packets to PIUs (see Figure 2, this page). A network configured to use NPSI with a terminal PAD does not require separate host PAD hardware at the host site.

However, additional software, and possibly more memory, is required in the front-end processor. Also, more processing must be done in the front-end processor to perform protocol conversion and packetizing. QLLC-compatible versions of the SDLC terminal PAD are currently available.

Because some packet-switch vendors developed SDLC pipe PADs before QLLC was around, some implementations use proprietary protocols for logical link control. Proprietary protocols accomplish the same functions as PSH or QLLC, but require the user to purchase both a terminal PAD and a host PAD. Telenet's host PAD is one example.

In addition to the logical link control protocol, each vendor must implement a means to transmit address mapping across the X.25 packet-switched network between the physical and logical SDLC stations.



The value-added approach

The value-added approach provides features that are not possible with the SDLC pipe or a leased-line network (see Figure 3, this page). These features include:

- Access by individual logical units to multiple hosts and applications, eliminating the need for cross-domain SNA-session establishment or System Network Interconnection.
- Preconfiguration of devices and controllers to allow network expansion with minimal effect on users.
- A configurable network-services screen or menu that allows users to input the X.25 address for the desired host and application. Implementations that use mnemonics or symbolic names make it easier for users to remember the destination host. Alternatively, users can select from a list of one or more preauthorized applications, reducing the process to making a menu selection.
- Rotaries allow a call request to a busy or inoperative host port to be be passed to the next available port.
- Access control can restrict the use of a host or application to a list of authorized users.
- Customized messages can instruct users on what steps to take next.
- SNA-to-BSC and BSC-to-SNA protocol conversion. A 3270 cluster controller using the BSC protocol can communicate with an SNA host. This makes migration from a BSC to an SNA network easier, since the SNA host can be brought onto the X.25 network without replacing the remote BSC equipment.

Like the SDLC pipe method, the value-added approach uses emulation to perform SNA-to-X.25 protocol conversion and requires a terminal PAD and a host PAD. A 3270 SNA/SDLC cluster controller interfaces with a terminal PAD that emulates the SNA functions of a host and a front-end processor. As with the SDLC pipe approach, all polling takes place between the terminal PAD and the cluster controller.

However, in addition to the SNA session activation protocols, which establish the SDLC link, the terminal PAD emulates the Systems Services Control Point functions normally performed in the host. As a result, the terminal PAD also emulates the protocols that activate the physical unit and the logical unit.

The bind, or session initiation, takes place locally between the terminal PAD, the 3270 cluster controller and the attached devices. When the cluster controller receives an SDLC frame, it strips off the header and trailer, leaving an SNA PIU. The PIU is then stripped of its transmission header and request/response header, leaving a request/response unit containing a 3270 data stream block.

The terminal PAD then places the request/response unit in an X.25 packet. Incoming X.25 packets are converted back to PIUs and SDLC frames and are forwarded to the cluster controller for distribution to its attached devices. Each display or printer is assigned an individual X.25 virtual circuit. The logical channel number, part of X.25, determines the packet's destination logical unit.

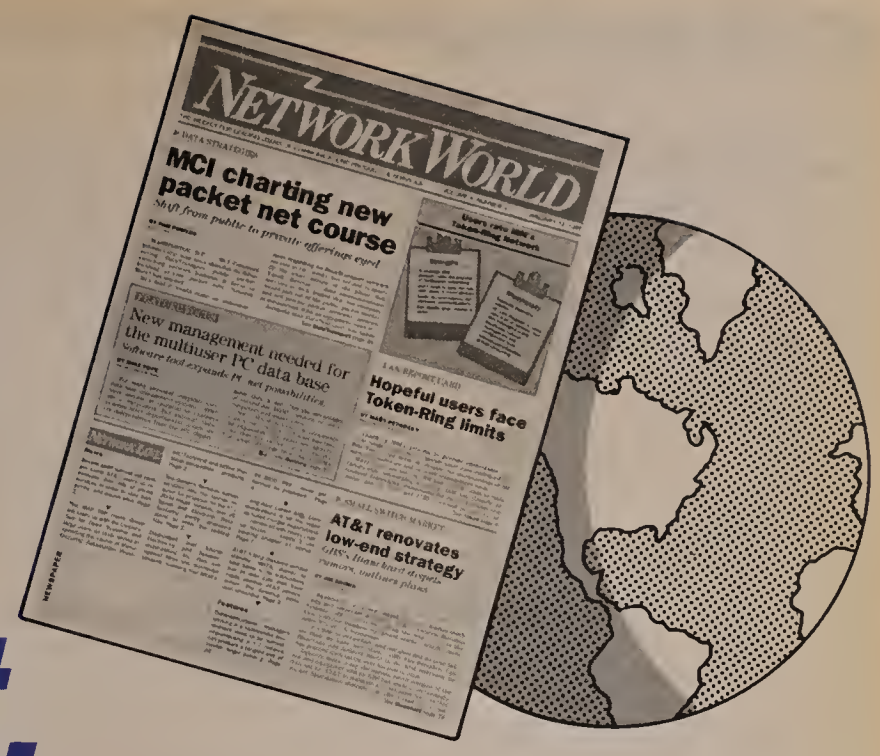
At the host site, a host PAD, connected to the front-end processor, emulates the SNA functions of the 3270 cluster controller and its attached devices. It also responds to polls locally and activates SNA logical unit-to-logical unit sessions between the host PAD and the host.

To establish the connection across the X.25 network, the user enters the network address or mnemonic for the desired destination host and application from his terminal. Alternatively, he is presented with a menu of applications from which to choose. A call-request packet is then sent from the terminal PAD to the appropriate host PAD. If the selected host and application are available, a call-accept packet is returned.

To define how SNA control information and 3270 data are handled across a packet-switched network, a transport layer protocol is required between the terminal PAD and host PAD. There is cur-

See **Connections** page 34

As networking takes over the world, Network World takes over the market.



The trend has never been clearer. Networking is now the major application market for communications. And a recent statement by Ken Olsen, President and Founder of Digital Equipment Corporation, substantiates this trend: "We have to start thinking of the computers as peripherals. You start with the network, then you hang the computers on later."

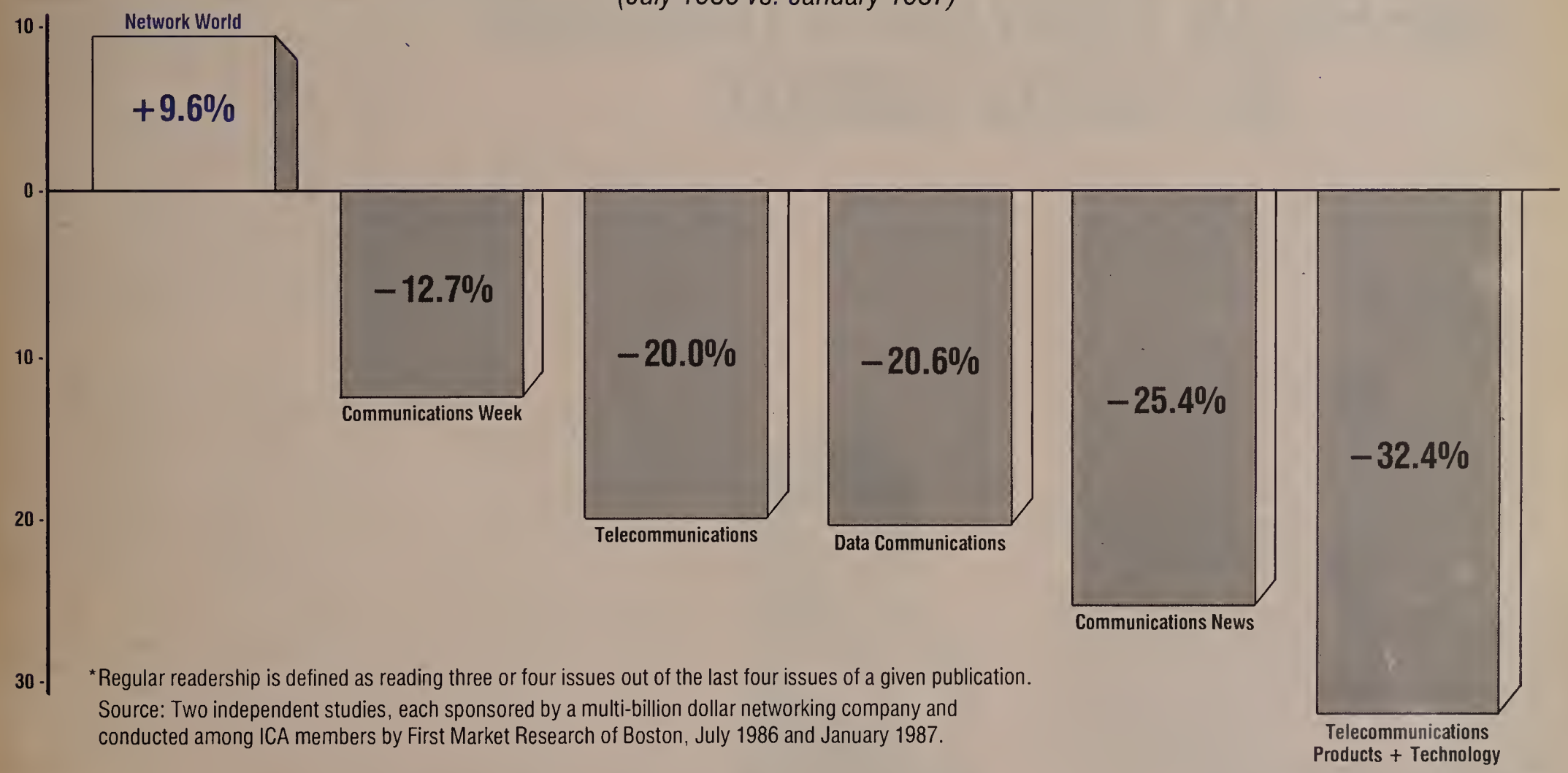
Networking. It's been *Network World's* focus from the very start. In fact, it is the *only* publication that covers the entire realm of communications from the networking point of view. And in doing so, *Network World* has established itself as the *standard* for communications users already networked or planning to network.

Today's users know they need up-to-date information in order to keep pace with the evolving world of networking. That's why they read *Network World*. And that's why *Network World* was the only publication to gain in regular readership in an independent study conducted among ICA (International Communications Association) members, some of the nation's most influential buying decision-makers for voice and data communications products and services.

The study, sponsored by a multi-billion dollar networking company and conducted in January 1987 by First Market Research of Boston, showed decreased readership of all communications oriented publications among ICA members since a previous study in July 1986. Only *Network World,* with its exclusive networking-oriented coverage, experienced an increase in regular readership. The percentage increase/decrease for each publication over that six-month period is displayed in the following chart.

Percentage Change in Regular Readership* among ICA Members

(July 1986 vs. January 1987)



*Regular readership is defined as reading three or four issues out of the last four issues of a given publication.

Source: Two independent studies, each sponsored by a multi-billion dollar networking company and conducted among ICA members by First Market Research of Boston, July 1986 and January 1987.

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Connections from **page 32**
rently no official standard for this type of protocol because the Consultative Committee on International Telephony and Telegraphy does not work with vendor proprietary standards such as IBM's 3270 protocol.

Instead, the PAD vendor must specify the protocol. In August 1981, Telenet, Tymnet and Datapac (the Canadian PDN) agreed to use the Display System Protocol (DSP) as the terminal PAD-to-host PAD protocol when interfacing 3270 BSC cluster controllers to an X.25 network. Since then, several other vendors have adopted this standard.

DSP can also be used to interface 3270 SNA controllers with an X.25 network. Because of its ability to translate one set of terminal characteristics to another, DSP is sometimes referred to as a virtual terminal protocol.

While DSP has gained much support, proprietary protocols also perform these functions. For example, Protocom Devices establishes an end-to-end session based on the Open Systems Interconnect model session layer protocol.

Network management

When inserting an X.25 network into an SNA network, the network operator must look carefully at how network management capabilities are affected. Some functions available in an SNA leased-line network may not be operational in an X.25 context.

SNA network management capabilities include the Network Communications Control Facility, Network Problem Determination Application, the Network Logical Data Manager and NetView. These commands and responses pass transparently through the X.25 network under the SDLC pipe approach.

Therefore, the collection of error statistics, logging of session activity and the testing of IBM intelligent modems can continue to operate as before.

Under the SDLC pipe approach, the packet-switched net management functions complement SNA network management capabilities, providing reports on SDLC link status and error conditions.

By contrast, under the value-added approach, some valuable SNA network management information is lost because emulation techniques separate the logical devices seen by the host and the physical devices located remotely across the X.25 network.

Packet-switched network management functions must replace many of SNA's. Status information on SDLC links, SNA states, error counts and traffic statistics are some items that must be reported.

SNA's network management cannot see into the packet network operation and vice versa. Therefore, it's important that the two network management functions complement each other to avoid vendor finger-pointing situations.

SDLC pipe vs. value added

The SDLC pipe and value-added approaches differ in the capabilities they provide. Under the SDLC pipe, the X.25 network is transparent to the user. Each 3270 cluster controller establishes a separate virtual circuit and devices on the controller all share the same virtual circuit, so there's no need for the user to select a destination address. Also, all devices on the same cluster controller communicate with the same host.

By contrast, under the value-added approach, the user selects a destination host and application from a menu, and each device establishes a separate virtual circuit. The SDLC pipe is a simpler approach, but it results in more heavily loaded virtual circuits and a loss of flexibility.

Also, the menu used in the value-added approach allows customization of how the network appears to users. Special instructions and messages can help users take advantage of the network's capabilities.

In the SDLC pipe approach, only the logical 3270 cluster controllers are kept in memory. The value-added approach requires that local images of both 3270 cluster controllers and individual devices be stored in the terminal PAD and host PAD memory. Resulting memory limitations may restrict the number of devices or controllers supported.

Finally, the value-added approach's BSC-to-SNA and SNA-to-BSC protocol conversion is desirable for upgrading networks from BSC to SNA. The SDLC pipe approach does not have this capability.

Conclusion

Most PADs on the market today use the SDLC pipe approach. Its ability to support many types of SDLC devices (IBM 89100, System/34, System/36 and System/38) in addition to 3270 cluster controllers, and the fact that the SDLC pipe approach is easier to develop, make it popular with vendors.

On the other hand, the value-added approach offers attractive network customization and BSC-to-SNA conversion, and that could force more vendors to provide PADs supporting it.

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–Greg King
Vice President of Marketing
TASK Technical Services, Inc.

Greg King is Vice President of Marketing at TASK Technical Services, Inc. of Wakefield, Massachusetts. An Information System Development consulting firm, TASK Technical Services develops high-level decision support systems for healthcare and financial institutions. And when TASK Technical Services needs to fill critical communications positions within the company, it looks to *Network World* for top-quality professionals.

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In the world of communications publications, you have two distinct groups. There are vendor-oriented books with an editorial content that's mostly trade related, and there are user publications that speak directly to end users involved with information processing. I need to target communications professionals at large user organizations – that's why *Network World* is the clear choice.

Based on your experience, what types of people do you reach with *Network World*'s classified section?
We've found that we reach, among others, professionals with a technical bent from Fortune 1000 firms – people who are exposed to a wide variety of equipment like hardware, software and networks. People who are responsible for evaluating, selecting and optimizing these technologies. And communications consultants who help develop advanced integration schemes.

What kind of success has TASK Technical had with *Network World* classifieds?
The best possible. We ran one ad that included two positions – an SNA consultant and a LAN specialist. We filled them both through *Network World*.



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Service Focus: Electronic mail services

Mixed messages

Despite its advantages, wide acceptance of E-mail awaits better connectivity.

BY JOHN J. HUNTER
Contributing Writer

Electronic mail has its roots in the early 1970s, when users of time-shared computer networks began sending messages to each other. For the few, relatively sophisticated early users of E-mail, that capability was a useful novelty.

Today, with the adoption of office automation in many corporations, electronic communications is in full flower. The introduction of stand-alone word processors, personal computers and simple, easy-to-use word processing and data communications software have further contributed to the growth of E-mail by greatly reducing its complexity. On a wide scale, however, E-mail has yet to be adopted.

E-mail services are still in their infancy, and, to the chagrin of vendors, they are not growing rapidly. According to Helen Callan, research associate for Link Resources Corp. in New York, E-mail revenues for 1986 were $248 million, with projected growth to $750 million by 1991. These figures look anemic when you consider that 11 principal E-mail vendors are competing for a small piece of the pie.

Hunter is president of TMS Corp., a marketing management consulting firm in Devon, Pa.

E-what?

E-mail is the part of any communications network that lets users send electronic messages to other subscribers on or off the network. Using a communicating device such as a personal computer, word processor or other terminal with a modem and proper communications software, a user can send and receive messages with other E-mail subscribers virtually instantaneously. Since E-mail messages are electronic in form, it's easy for the recipient to answer, edit, annotate or forward them. In addition, users can broadcast messages to other users on the network.

Using E-mail has several advantages. First, "telephone tag" problems are eliminated. Also, it's cheaper to send large volumes of information via E-mail than by ordinary telephone conversation. Finally, E-mail delivery is much faster than regular, hard-copy mail.

On the other hand, E-mail systems, like any public data base, are subject to security problems. Without effective multilevel passwords, there's no guarantee that E-mail suppliers can prevent illegal accessing and erasure of stored messages. Also, there is no wide-scale implementation of interconnection between systems.

In addition, costs can be astonishingly high unless strict control is asserted over the use of E-mail systems. Logging on to the system to browse not only runs up connection costs, but telephone-line charges as well. Further, users will be shocked when they receive their monthly bill if they routinely clog the network with trivial messages that are broadcast to many users.

Service offerings

E-mail services fall into two classes: public and private. As the

☞ See **Mixed messages** page 36

Electronic mail services

Vendor	Product	Connection services: Telex	International	Other E-mail	Private networks	Message alert	Subscription fee per user	Communications software fee	Usage charges: Connection time	Characters transmitted	Printed copy delivery charges: Regular mail	Overnight
AT&T Information Systems, Inc. Morristown, N.J.	AT&T Mail	✓			✓ (Unix users only)	✓	$24 per year	$190	None	$.40 for first 401 characters; $.80 for 402 to 7,500 characters	$2.00 for 7,500 characters	$7.50 for 7,500 characters
CompuServe, Inc. Columbus, Ohio	EasyPlex and InfoPlex	✓	✓ (InfoPlex only)	✓			$39.95 (one-time charge)	None	$12.75 per hour at 300 bit/sec; $15.75 per hour at 1,200 bit/sec	None	NA	NA
Computer Sciences Corp. Infonet Divison El Segundo, Calif.	Infonet	✓	✓		✓	✓	$250 to $1,600 per year per port*	None	None	$.02 to $.15 per 1,000 characters*	NA	NA
Dialcom, Inc. Rockville, Md.	Dialcom	✓	✓				None	None	$14 per hour	None	NA	NA
General Electric Information Services Co. Rockville, Md.	Quick-Comm	✓	✓		✓		$12 per year	$249	None	$.35 for 100 to 300 characters; $.70 for 301 to 1,500 characters; $1.00 for all remaining characters	$2.25 for first page; $1.00 for each additional page	NA
McDonnell Douglas Electronic Data Interchange Systems Co. San Jose, Calif.	ONTyme	✓	✓	✓			$200 per month	$170	$3 per hour	$.25 per 1,000 characters***	NA	NA
MCI Telecommunications Corp. Washington, D.C.	MCI Mail	✓	✓	✓	✓	✓	$18 per year	$49.95	None	$.45 for first 500 characters; $1.00 for 501 characters and over	$2.00 for first six pages; $1.00 for each three additional pages	$8.00 for first six pages; $1.00 for each three additional pages
RCA American Communications, Inc. Princeton, N.J.	RCA Mail	✓	✓				None	$50	$.40 to $.65 per minute*	None	NA	NA
The Source Telecomputing Corp. McLean, Va.	The Source						$52.95 (one-time charge)	None	$.14 to $.46 per minute*	None	NA	NA
US Sprint Communications Co. Reston, Va.	Telemail	✓	✓	✓**			$140 per month	None	$14 per hour	$.05 per 1,000 characters**	$1.50	NA
Western Union Data Services Co. Mahwah, N.J.	EasyLink	✓	✓		✓		$25 per year	$150	$.30 per minute	None	$1.50 for first page; $.50 for each additional page	NA

*Charges based on port speed and time of day terminal connections made. **international service only. ***A monthly minimum usage fee of $500 is charged. SOURCE: TMS CORP., DEVON, PA.

Mixed messages from **page 35**

names imply, public networks are open to everyone, while private E-mail network services are used only by specific groups. Of the E-mail networks listed in the chart, only AT&T's AT&T Mail, Computer Sciences Corp.'s (CSC) Infonet, Western Union Corp.'s EasyLink, MCI Telecommunications Corp.'s MCIMail and General Electric Information Services Co.'s (GEISCO) Quick-Comm are private networks.

In all, E-mail services users receive a mailbox, or address, and can assign passwords to their mailboxes to prevent unauthorized persons from reading their mail. With so-called public mailboxes, most E-mail services let users assign other passwords to group or departmental mailboxes. AT&T, Western Union, MCI and The Source Telecomputing Corp. do not support multiple passwords.

Anyone with a personal computer or a word processor can take advantage of public E-mail services. All that's needed is a Bell 103 (300 bit/sec) or 212A (300 or 1,200 bit/sec) modem and special communications software (provided by the vendor) that lets subscribers send, receive and print messages.

For users requiring a printed message, many E-mail services furnish copies through courier, regular mail or overnight delivery services. These services offer an added advantage in that users can send messages to an E-mail service center and have copies delivered to persons who don't subscribe to the E-mail system.

In addition, AT&T, US Sprint Communications Co. and MCI will print messages on the user's letterhead, if desired.

Besides sending conventional text messages, all E-mail services — except Western Union, RCA American Communications, Inc. and The Source — allow binary data transmission. This is extremely useful, since it lets users send programs and spreadsheets. Another useful service is message alert. With this service, the provider calls the subscriber and tells him that a message is in his mailbox if he fails to retrieve it before a specified time. Of the E-mail service providers, only CSC, AT&T and MCI provide this service.

> Besides sending conventional text messages, all E-mail services allow binary data transmission. This is extremely useful, since it lets users send programs and spreadsheets.

Many E-mail services offer international delivery to Canada, Europe, South America and the Far East. To implement international E-mail, vendors rely on several methods. These include working with operating partners within the destination country to furnish electronic messages directly to the addressee and linking to local postal services, which then deliver a printed message.

While network interconnection is the principal focus of most E-mail service providers, many are now offering application packages to further increase their network's utility. McDonnell Douglas Electronic Data Interchange Systems Co., for example, is offering a variety of application packages, such as remote order entry and sales information management, to users of its ONTyme service.

GEISCO is also emphasizing applications that offer text generation, bulletin board and other services to its Quick-Comm subscribers. One of GEISCO's most ambitious offerings is its Business Link package, which offers a full range of business-oriented applications, including the ability to build private data bases. However, at a cost of $20,000 for installation and $36 per hour during prime time, Business Link is far from inexpensive.

The major factor impeding broader acceptance of E-mail is

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Title _____ Date _____

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PLEASE ANSWER ALL QUESTIONS, SIGN AND DATE THE CARD.

1 My primary areas of activity. (Circle ONE only)
I am involved in evaluating communications (data, voice and/or image) products and services:
1. for *use within my own* company/organization
2. for *resale* to other companies/organizations
3. Both
4. Other (explain) _____

1a For communications, my primary responsibility is: (Circle ONE only)
1. Data Communications
2. Voice Communications
3. Both
4. Other (explain) _____

2 Circle only the ONE title classification which most applies to you.

Company Management
11. Chairman, Pres., Owner, Gen. Mgr., Partner, Director, CEO, VP, Dir. Head of Finance, Admin. Procurement

Communications Management

Data Communications
21. Management
VP, Dir., Mgr., Head, Chief: Data Communications, including Networks, Engineering, Design, R&D, Application Development
22. Supervisory/Staff:
Supervisor, Head: Networking, Design, Analysis, Engineering, R&D, Applications, Services

Telecommunications
31. Management
VP, Dir., Mgr., Head, Chief: Telecomm., Voice Comm., including Networks. Engineering, Design, R&D, Application Development
32. Supervisory/Staff: Supervisor, Head: Networks, Design, Analysis, Engineering, R&D, Applications Services

Factory Communications
41. Management
42. Supervisory/Staff

MIS/Data Processing
51. Management
VP, Dir., Mgr., Head, Chief: MIS/DP, Systems Application Development, Operations, Office Automation
52. Supervisory/Staff: Supervisor, Head of Systems Design, Analysis Applications

Others
75. Consultant
80. Educator
85. Financial Analyst
90. Marketing/Sales
95. Other _____

3 Job Function
Which one of the following best describes your functional involvement with communications (data, voice, and /or video) products? (Circle ONE only)

Corporate
1. Business Management, Planning and/or Development

Communications System/Network
2. Management, Planning and/or Development
3. Implementation and/or Operation
4. Other _____

4 Which one of the following best describes the primary business activity of your organization at this location? (Circle ONE only)

Consultants
11. DP/Communications Consulting Services
12. Consulting Services (except DP/ Communications)

End Users
13. Manufacturer (other than computer/communications)
22. Finance/Banking/Insurance/Real Estate
23. Education
24. Medicine/Law
25. Wholesale/Retail Trade
26. Public Utility/Transportation
27. Mining/ Construction/ Petroleum Refining/ Agriculture/ Forestry
28. Business Services (excluding DP/Communications)
29. Government: Federal
30. Government: State/Local

Vendors
41. Carrier: including AT&T, BOCs, Independent Telcos, Public Data Networks, International Records Carriers
42. Interconnect
43. Manufacturer Computer/Communications Equipment
44. Value Added Reseller (VAR), Systems House, Systems Integrator
45. Distributor
46. DP/Communications Services (excluding consulting)
95. Other _____

5 In which ways do you typically become involved in acquiring communication products (data, voice, and/or video) and services? (Circle ALL that apply)
1. Recommend/Specify
2. Identify/Evaluate Potential Vendors
3. Approve the Acquisition
4. None of the Above

6 Check ALL that apply in columns A and B.
A. I am personally involved in the acquisition process (specification, selection, approval) for the following products and services:
B. These products and services are presently in use at this location:

A	B	Product/Services
		Computers
☐	☐	01. Micros
☐	☐	02. Minis
☐	☐	03. Mainframes
☐	☐	34. Printers
		Data Communications
☐	☐	04. Communications Processors
☐	☐	05. Comm./Networks Software
☐	☐	06. Digital Switching Equipment
☐	☐	07. Facsimile
☐	☐	08. Modems
☐	☐	09. Multiplexers
☐	☐	10. Protocol Converters
☐	☐	11. Network Mgmt. & Control
☐	☐	12. Test Equipment
☐	☐	13. 3270 Controllers
☐	☐	35. Intelligent Terminals
		Telecommunications
☐	☐	14. PBXs
☐	☐	15. Key Systems
☐	☐	16. Central Office Equipment
☐	☐	17. Integrated Voice/Data Terminals

A	B	Product/Services
		Transmission/Network Services Equipment
☐	☐	18. Microwave
☐	☐	19. Satellite Earth Stations
☐	☐	20. Local Area Networks
☐	☐	21. Wide Area Networks
☐	☐	22. Packet Switching Equipment
☐	☐	23. Fiber Optic Equipment
☐	☐	36. T1
		Communications Services
☐	☐	24. Packet Switching Services
☐	☐	25. Cellular Mobile Radio Services
☐	☐	26. Electronic Mail
☐	☐	27. Enhanced Services
☐	☐	28. Centrex
☐	☐	29. Long Haul Services
☐	☐	30. BOC Services
☐	☐	31. Independent Telco Services
		Other
☐	☐	32. Factory Communications
☐	☐	33. Online Data Bases

7 Estimated value of communications systems, equipment and services:
A. which you helped specify, recommend or approve in *last* 12 months? (Check only ONE in column A.)
B. which you plan to specify,recommend or approve in *next* 12 months? (Check only ONE in column B.)

A	B		A	B	
1. ☐	☐	$10 million and over	6. ☐	☐	$100,000 - $249,999
2. ☐	☐	$5 million - $9.9 million	7. ☐	☐	$50,000 - $99,999
3. ☐	☐	$1 million - $4.9 million	8. ☐	☐	Under $50,000
4. ☐	☐	$500,000 - $999,999	9. ☐	☐	Don't Know
5. ☐	☐	$250,000 - $499,999			

8 Estimated gross annual revenues for your entire company/institution:
(Circle ONE only)
1. Over $1 billion
2. $500 million to $1 billion
3. $100 million to $499.9 million
4. $50 million to $99.9 million
5. $10 million to $49.9 million
6. $5 million to $9.9 million
7. under $5 million

9 Estimated number of total employees at this location:
(Circle ONE only)
1. Over 5,000
2. 1,000 - 4,999
3. 500 - 999
4. 250 - 499
5. 100 - 249
6. 50 - 99
7. 20 - 49
8. 1 - 19

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2. Answer all questions
3. Sign and date form

Enclosed is my:

☐ Address change.
☐ New subscription request.

THANK YOU.

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PLEASE TAPE HERE

connectivity. Unlike telephone systems, E-mail systems are not widely connected. According to Link Resources, only about 792,000 E-mail mailboxes exist on public networks, and even for those mailboxes, communication is impossible unless the sender and receiver subscribe to the same network. That situation, however, is starting to change. MCI has announced a nationwide link to CompuServe, Inc.'s EasyPlex E-mail service and to France's Missive Service for International E-mail.

MCI has been a leader in establishing E-mail links between MCI Mail and private E-mail systems used by major corporations and universities with its MCI Link and VAX Mail Gate software. MCI Link handles IBM Professional Office System (PROFS) users, while VAX Mail Gate will link Digital Equipment Corp.'s All-in-1 users. Those moves are consistent with MCI Mail founder J. Robert Harcharik's plan to establish MCI Mail as the best network for interorganizational electronic communications.

The competition, however, is in no mood to concede the private network interconnect market, which has some four million users. Western Union offers a transparent link between its EasyLink service and IBM PROFS and DISOSS through software that resides in EasyLink computers. AT&T has also signaled its intention to provide links between its service and diverse E-mail systems. AT&T's initial offering, however, is limited to Unix-based users. GEISCO and CSC also offer links to private networks.

DA Systems of Campbell, Calif., is a relative newcomer to E-mail and has different ideas about system connectivity. DA Systems is not offering an E-mail service per se, but a means for diverse networks to communicate through DA Net, a message store-and-forward network that allows subscribers to send messages to each other, regardless of the E-mail system they use.

Usage costs

The costs of subscribing to E-mail services are structured much like those of time-sharing systems. Users pay a basic subscription fee and are billed on the number of characters transmitted or the amount of connection time. Other charges may accrue according to the time of day the service is used or the data transmission speed.

CompuServe charges by transmission speed, while CSC charges by transmission speed and time of day. RCA and The Source impose charges depending on the time of day the service is used. In the accompanying chart, the lower usage-rate figure applies to connections made after normal business hours.

Some vendors also charge for storing messages in the vendor's data base beyond an agreed-upon storage time. For example, AT&T and McDonnell Douglas charge one cent per message (one message is about 7,000 characters) per day, while US Sprint charges seven cents per message per day. Dialcom charges 50 cents per message after 10 days of storage.

None of the other E-mail providers charge extra for messages stored beyond a specified time period.

With some E-mail providers, the more you use E-mail, the cheaper it gets. Many vendors offer discounts ranging from 5% to 30% based on dollar-volume usage. Those vendors offering no discounts include CompuServe, US Sprint, GEISCO, RCA and The Source.

High subscription fees

As the accompanying chart on page 36 shows, CSC, US Sprint and McDonnell Douglas have considerably higher subscription fees than other vendors. When questioned, these vendors responded that they're interested only in large corporate customers and not the casual user. There's certainly nothing casual about US Sprint and McDonnell Douglas' $500 minimum monthly usage charge.

US Sprint might be having second thoughts about positioning its service, as a less costly version of its Telemail will soon be available for a $15-per-year subscription and a $20-per-user monthly fee. No details on service features were available at press time.

Outlook for E-mail

The key to connectivity is the development of a common protocol, which is hopefully what the CCITT's X.400 standard will provide. A CCITT study group has been working on an E-mail standard since 1981, and a current version of X.400 is now in use in Europe. X.400 runs as an application in the Open Systems Interconnect (OSI) protocol and provides a generic link between diverse E-mail networks. It does not currently provide end-to-end service, since the process for converting documents from one E-mail format to another is left to the E-mail provider or the user.

However, the second-phase X.400 recommendation that is scheduled for completion during 1988 will support document conversion.

Users should be aware that vendors may take any one of three general approaches to implementing X.400. According to J.J. Cinecoe, senior product manager for OSI networking at Wang Laboratories, Inc., some vendors may start from scratch and implement a pure X.400 user interface that supports only services specified within the standard.

Other vendors, also starting from scratch, may offer a modified user interface that supports X.400 plus additional services not specified by the standard. Third, some vendors whose E-mail products are not fully X.400-compatible may choose to retain their current products and implement X.400 gateways that support less than full X.400 functionality.

The chances of X.400 being widely implemented in the U.S. are good, since many communications equipment vendors support it. Some of the major vendors with representatives on the X.400 standards committee are Northern Telecom, Inc., Wang, Digital Equipment Corp., and GTE Corp.

For the most part, E-mail service providers have seen nothing but red ink for their trouble, and they don't need more competition. But that's exactly what they'll get if current proposals to let the Bell operating companies sell electronic information services are accepted. While such competition may be good in the long run, its immediate impact will likely be to push large E-mail suppliers such as RCA, Western Union, US Sprint and MCI into a defensive position. As a result, these companies may try to maintain current customers by deferring the network interconnections necessary to further spur the growth of E-mail.

PRO from **page 26**

time, since it merely requires upgrading electronics, not the laying of additional cable. The current lack of available frequencies and the time and cost to launch new satellites are significant obstacles to capacity additions.

Fiber more secure

With fiber-optic facilities, it is practically impossible to interrupt optical signals without detection. Fiber transmission is more secure than that of any other technology available today. When using satellites, many government communications must be fully encrypted, a requirement not always imposed on fiber-optic systems.

Because of its high capacity, fiber optics have a very low cost per channel mile. Another less obvious attraction is the fiber-optic system's life span of at least 25 years, compared with the seven-to-10-year life span of a satellite.

These economic advantages partly explain why fiber-optic undersea cables like AT&T's TAT-8 are now being installed for international use. The growing use of fiber optics for international telecommunications attests that the cost per channel mile for fiber optics is far lower than for other terrestrial or satellite systems.

Another advantage of fiber optics is often overlooked. As the newer of the technologies, and as one that will exist quite some time, fiber optics is the technology with which the brightest engineers and scientists will want to work. This in itself helps guarantee continued new fiber-optics development and a dominant industry position.

Satellite's wide footprint, and its advantages in point-to-multipoint communications, give it a distinct place in applications such as broadcast television distribution and remote location connections. Satellite and fiber optics will clearly coexist for many years. The smart telecommunications manager will take advantage of each system's strengths to create networks that combine them for maximum benefit.

Rewriting the old rules

There is little doubt, however, that fiber optics' superior quality, high capacity, low unit cost and long economic life have forced the old rules to be rewritten. No longer is satellite the first choice for long-haul domestic or even international telecommunications. For now, and for the foreseeable future, the choice is clearly fiber optics.

ISDN from **page 4**

microcomputers to the department's IBM IMS data base management system at 9.6K bit/sec. These micros are outfitted with NCR boards that support the 2B+D ISDN interface. Amidon said he will push that speed to 56K bit/sec once all parties are comfortable with the equipment in the trial.

Like Beauchat, Amidon is anxiously awaiting a pricing structure for ISDN service from Mountain Bell. And, like the Department of Administration, the Department of Transportation is planning to install tried-and-true communications systems while it awaits commercial availability of ISDN. "I hear an ISDN line will probably cost more than one [telephone] line but less than three," Amidon said.

> Amidon is awaiting a pricing structure for ISDN service.

"I assume it won't be a one-for-one swap," Amidon said. "If I can use one line to replace eight or 10 terminals or phones, I expect it to cost more," he said.

Amidon said the department will probably soon install a short-haul microwave system to provide voice and data commmunications services to a department facility situated three to four miles south of the group headquarters. "We have applications for ISDN outside the two-mile radius of the ISDN central office that service is limited to," he said.

Earl Vogt, telecommunications services department manager for the U.S. Bank of Oregon in Portland, Ore., is the first user of Pacific Northwest Bell's ISDN field trial, which began earlier this month. Up to 15 bank locations will receive ISDN service from a single Northern Telecom DMS-100. Some 200 basic-rate ISDN lines are scheduled to be installed before the completion of the test in March 1988.

Vogt is optimistic about the fledgling trial. He cautioned those users closely monitoring the ISDN trials to consider the operational costs associated with merging voice and data departments within a company when formulating a business plan for ISDN.

▶ INTERFACE '87

Show hosts raft of product debuts

BY JOSH GONZE
Staff Writer

LAS VEGAS, Nev. — A variety of new products is expected to be introduced at the Interface '87 conference and exhibition here this week. Among the vendors planning announcements are:

■ Proteon, Inc. will announce support for VMEbus-based computers and workstations on its ProNET-4 4M bit/sec token-ring network. The company's new p1542 interface board allows VMEbus computers to communicate with computers in an IEEE 802.5-compliant network (see "Proteon to offer ProNET boosts at conference," page 5).

Proteon will also announce enhancements to its ProNET-4 interface boards for IBM Personal Computers and ATs that enable IBM Token-Ring Network software to be used for personal computer workstations.

■ Paradyne Corp. will unveil a network management system and a line of high-speed diagnostic modems. The net management system will offer access to host and network applications, including IBM's NetView, as well as reporting and monitoring capabilities. The modems are very large scale integration (VLSI)-based and have user-selectable networking options.

■ Canoga-Perkins will introduce its Model 3124 T-1 Voice & Data Multiplexer, which boasts Digital Access and Cross-connect System D4 compatibility, submultiplexing, 192 user channels and network management capabilities. It supports voice applications by pulse code modulation.

■ General DataComm, Inc. will unveil two private-line modems, one that operates at 1,800 bit/sec and another that works at 9.6K bit/sec. The company will also introduce two switched-network private-line modems operating at 2.4K bit/sec and 4.8K bit/sec. The products offer diagnostic test capabilities initiated at the front panel and monitored with an LED display.

■ Infotron Systems Corp. will introduce a six-member line of CCITT-compliant diagnostic modems. The modems, dubbed the INModem Series, can be monitored and controlled with the INM Diagnostic Modem Controller. Four of the modems are analog, supporting speeds up to 14.4K bit/sec, and two are digital, transmitting from 2,400 to 56K bit/sec over the Dataphone Digital Service (DDS) net.

■ Allen-Bradley Co. will announce a 19.2K bit/sec frequency-agile modem for use in broadband factory networks. The modem links asynchronous hosts to asynchronous peripherals such as programmable controllers and vision systems or IBM cluster controllers.

■ Teltone Corp. will unveil two additions to its data-over-voice product line. TelLAN is a modular, 1M bit/sec local-area network, and DCS-3B is an enhanced version of Teltone's Data Carrier System. TelLAN runs on existing telephone wire without affecting voice traffic, the company said. Intelligent network interface units link devices to the net. The DCS-3B transmits data at 19.2K bit/sec, up to 10,000 cable ft, on nonloaded telephone loops at frequencies under 100 kHz.

■ Universal Data Systems, Inc. will introduce a V.32-compliant modem that supports full-duplex operation over dial-up or private lines at 4.6K or 9.6K bit/sec. The modem features an adaptive echo cancellation scheme.

■ Fibronics International, Inc. will add the FM 1500 multiplexer to the company's Cable Bandit Series. The 32-port multiplexer is VLSI-based and meant for use in an IBM Data Entry System Category A device environment.

■ Data Switch Corp. will announce several new products, including one addressing the distributed matrix switching market and a network management system that controls both T-Bar, Inc. and Data Switch equipment.

■ ISC Datacom will unveil a line of radio-frequency modems for broadband communications at 19.2K, 56K and 64K bit/sec. The modems provide error correction, local and remote menu-driven control and 66 MHz of frequency coverage in 25-KHz increments.

■ Microtel, Ltd. will introduce a very small aperture terminal satellite system called the Spacetel DS2100.

■ Information Technologies, Inc. will announce a new micro-to-mainframe link that operates over coaxial cable through IBM controllers. The company will also unveil enhancements to several other products, including its LinkUp 3270 NETBIOS LAN Gateway Series.

■ Dynatech Communications, Inc. will introduce a multirate channel/data service unit that offers three operational modes, including DDS, limited-distance and DDS secondary channel. The 2200 Omegaserv works at 2,400 bit/sec on 19-gauge wire.

■ Okidata will announce a 9.6K bit/sec diagnostic modem for use over dial-up or dedicated lines. The CLX96DP modem is V.29-compliant and features automatic adaptive equalization.

Concerns from **page 2**

Bell, an attorney who will be speaking at a session entitled "Computer Inquiry III: What's Left for Users?"

Another session, "On the Docket in '87: User Concerns," chaired by Frederick Cooper III, will explore issues currently being weighed by the Federal Communications Commission. Cooper is managing partner for the computer and communications department at the Atlanta-based law firm of Hurt, Richardson, Garner, Todd and Cadenhead.

Among those user concerns, Cooper said, are Phase 2 of the Third Computer Inquiry, the removal of separate subsidiary requirements, changes suggested by the Huber report and new guidelines for entry of the Bell operating companies into unregulated services.

Users attending any of three sessions on communications law are likely to learn that the best way to prepare for regulatory and legal changes on the horizon is to keep close tabs on the action in Washington, D.C.

"It behooves the user to pay attention, because to one degree or another, he's left to his own devices to protect himself," Bell said. "Large users have to be more concerned about how the regulatory process affects them directly."

Along with regulatory matters, network management also occupies a top spot on attendees' agendas this year because "different technologies, like wide-area networks and local-area networks, are starting to come together," according to Frank Dzubeck, president of Communications Network Architects, Inc.

Dzubeck will be chairing two sessions: "Net-to-Net Connectivity Advances," which will examine architectural and strategic solutions to user problems, and "Improving Your Private Network's Profit and Loss." The latter will feature MIS managers from Bechtel Group, Inc. and Digital Equipment Corp. discussing how communications contributes to their companies' bottom lines.

At the connectivity session, Susan Borden, an IBM representative, will describe IBM's strategic perspective and some IBM plans never before revealed to users, Dzubeck said.

Another session speaker, Israel Gitman, president of DVI Communications, Inc. in New York, who will be chairing a session entitled "LAN Utilization Survey," said that the industry needs specifications if network management is to advance.

Other issues likely to attract users at Interface '87 are very small aperture terminal networks and methods to make private nets more flexible through use of private or public packet-switching facilities.

"VSATs are starting to come down in price, to the point where they are competitively priced," Dzubeck said. VSAT technology can now support commingling of services, in which different channels can be allocated to voice, data and video.

Interface from **page 6**

The thousands of users on the various Department of Defense networks, known as the Internetwork, are also free to comment, said Dan Lynch, president of Advanced Computing Environments, organizer of the conference.

The Internetwork is a series of TCP/IP-based networks, including the Defense Department's Military Network (MILNET) and Advanced Research Projects Agency Network (ARPANET), which are interconnected via gateways. MILNET is a backbone network used by the military for communicating unclassified information. ARPANET, also a backbone network, is used by various government and university research groups.

Prior to the proposal of the standard, there was no framework vendors could use to develop a common type of NETBIOS-to-TCP/IP interface, said Dave Crocker, software development manager for Ungermann-Bass, Inc. However, he said the standards task isn't done.

"The proposal needs more review," Crocker said. He expects that specification problems will be uncovered and will have to be resolved. "I have absolutely no idea how long that's going to take," Crocker said.

Excelan, Inc.'s Arvind Agrawal disagreed. "The problem is finite in scope. The work has been done, and we do not anticipate significant modifications," said Agrawal, director of software development for TCP/IP products.

Neither Crocker nor Agrawal would say when their companies would implement the new interface within their TCP/IP implementations. However, Lee LaBarre, a member of Mitre Corp.'s technical staff, has indications from several vendors that products based on the proposed NETBIOS-to-TCP/IP interface standard could appear in as little as three months.

The real problem is that there is no test for proving conformance to the proposed standard, LaBarre said. Mitre hopes vendors will implement the proposed standard "in an attempt to attain interoperability," LaBarre said.

However, both Ungermann-Bass' Crocker and Subhash Bal, Excelan's vice-president of marketing, expect users such as Boeing Computer Services Co. and Mitre will bring these products into their laboratories, discover problems and go back to the vendors to resolve these questions.

"It's the marketplace that's going to force this one," said Bal. "Users will act as the [conformance] body that is required." He added that Excelan also does some interoperability testing as part of its product development.

Recognizing that vendors are reluctant to take on the task of interoperability testing, LaBarre urged users to hold vendors responsible for proving their NETBIOS-to-TCP/IP implementations interoperate.

Critics from **page 1**

During the last few years, customers have complained loudly to IBM about the difficulties involved in linking applications running on different types of IBM hardware. SAA represents a broad strategic outline that maps out how the company plans to address that problem, observers agreed.

SAA spells out the software interfaces, conventions and protocols to be used in developing portable, interoperable applications. IBM intends to publish technical information this year on SAA components and will offer SAA products and SAA-compatible applications in the future. But IBM watchers say it could be five years before users see SAA's benefits.

L. David Passmore, group manager at Network Strategies, Inc., a consulting firm in Fairfax, Va., said he believes IBM introduced SAA in response to Digital Equipment Corp. Because DEC supports consistent software and networking schemes, the company has made substantial inroads into IBM's territory. Now IBM is trying to outfit its systems with similar capabilities.

Dale Kutnick, executive vice-president at the Gartner Group, Inc., a consulting company in Stamford, Conn., disagreed, saying IBM is simply responding to its customers' needs. "Only in the most minimal way is the announcement a direct response to DEC," he said. "IBM is trying to increase its large-customer sales by making users comfortable with its long-range architectural plans."

If IBM is following DEC's lead in providing consistent software across machines, it has chosen a different path to that end. DEC's consistency stems from its single architecture approach to hardware. IBM is maintaining adherence to a multiple-hardware architecture strategy and is using SAA to develop software that can be ported with minimal changes from machine to machine.

IBM is trying to free application software from both hardware and network constraints, according to Frank Dzubeck, president of Washington, D.C.-based Communications Network Architects, Inc. "IBM is saying that the protocols and networking techniques such as SDLC, Ethernet, and Token-Ring are not major issues," he said.

Other analysts characterized the task of providing such freedom as gargantuan. "IBM is going to have to rewrite almost all of its current communications and application software," noted Donald Czubek, president of Gen2 Ventures, a consulting firm in Saratoga, Calif.

The herculean task has been made somewhat easier by recent changes within IBM, according to Dzubeck. "One reason why IBM products could not easily communicate was that various divisions functioned autonomously," he said. "IBM has been slowly reorganizing itself so all of the company's divisions are marching to the same drummer." For the last eight months, the company has been restructuring to meet this goal.

IBM must still face up to a number of difficult decisions. First, IBM had to choose certain items from its myriad of network offerings to serve as SAA cornerstones. The Token-Ring Network, Structured Query Language (SQL), X.25 and LU 6.2 were some of the items in last week's announcement.

A number of products and communications schemes were left out of the announcement. Analysts expect newer products, such as Advanced Program-to-Program Networking and Distributed Data Management to be incorporated into SAA eventually. IBM may use SAA to force users away from older offerings to newer products. For example, SAA may move some customers from the IMS data base management system to SQL-based DB2.

IBM will also have to marshal its resources to ensure that the chosen items are consistently implemented on all systems and software. "Compromises were made when items such as LU 6.2 were implemented on some systems," noted Kutnick. LU 6.2 capabilities differ in IBM Personal Computer, System/36 and mainframe implementations of the protocol.

TUMs from **page 1**

derstand the client's needs and make net design recommendations.

A top IBM official acknowledged existence of the TUM service, adding that it is part of the Enterpise Marketing Program that began in 1985. He said the service has been favorably received by many of the large user organizations that IBM has asked to participate.

Aetna Life and Casualty Co., First Interstate Services Co., a subsidiary of First Interstate Bancorp., and System One Corp., a subsidiary of Texas Air Corp., are a few of the companies taking advantage of the program, with a TUM onsite.

A communications engineer at one TUM account on the West Coast said the IBM representative has already influenced the design of his company's network. "IBM pointed out some ways we could cut our costs and optimize our network," said the engineer, who asked not to be named.

Besides being conversant with both IBM and Rolm product lines, TUM personnel are knowledgeable about a wide range of telecommunications support tools. A TUM, for example, may help a customer schedule a visit to IBM's Communication Products Division in Raleigh, N.C., to use tools maintained there that are designed to help customers optimize networks for performance. TUMs may also help customers plan net enhancements.

For support, TUM personnel have direct access to key IBM and Rolm technicians trained to help customers sort out problems.

The key difference between the TUM program and current methods of support is that IBM is pushing the support services rather than merely making them available. "IBM is aggressively moving into the telecommunications market," noted James Weiss, vice-president of telecommunications at System One, an early TUM account.

The move to add TUMs to the IBM support staff is in concert with directions hinted at last fall by IBM Chairman John F. Akers. At that time, IBM undertook an extensive corporate reorganization with a key goal of shoring up the company's sales and support staffs. Akers said then that IBM might supplement its support staff with personnel dedicated to specific customer needs, such as application software. Since the reorganization, the company has moved 3,000 employees from middle management to support positions, thus increasing the size of its sales and support staff to 27,000.

Despite the fact that IBM pioneered customer hand-holding, other vendors have leapfrogged Big Blue in terms of communications support. Users contacted said that Digital Equipment Corp., Tandem Computers, Inc. and others have been offering dedicated data communications support personnel to large accounts for some time. AT&T and Northern Telecom, Inc. have also reportedly provided voice support personnel.

The IBM official said the company is gradually implementing TUM with its Enterprise accounts. But communications managers at some major IBM accounts contacted by *Network World* were unaware of the TUM service.

A communications engineer at one large firm said his company heard rumors of the TUM program and was wondering how customers qualified for it, when IBM suddenly added a TUM manager to the staff serving his company.

Some larger IBM accounts said they would not be interested in the program, even if offered a TUM representative. Willliam Harris, director of network services at McDonnell Douglas Corp. in St. Louis, said network design decisions are under the aegis of the company's telecommunications staff and that he doubted any one vendor would be suited to help the company optimize its large hybrid network.

Other customers may be wary of TUMs because the representatives not only help manage a firm's network, they must help IBM sell its products. "If the IBM representative recommended another vendor's equipment, he would be out of a job in about six seconds," said one user, who did not want to be identified.

Interface from **page 1**

cations, including screen layout and menu presentation. IBM has been criticized for supplying customers with inconsistent interfaces across its software line.

Common Programming Interface defines an application programming interface for SAA-compatible programs. The interface specifies the languages and services to be used in developing applications that can be integrated with other applications and ported to different environments.

Languages specified in the SAA announcement are COBOL, FORTRAN and C. Other programming components outlined within the Common Programming Interface are a data base interface based on IBM's Structured Query Language, an application generator based on elements of the company's Cross Systems Product and a query interface based on extensions to the interfaces in IBM's Query Management Facility. The presentation interface is based on extensions to the interface in IBM's Graphical Data Display Manager.

Common Communications Support defines communications tools to be used in linking SAA-compatible applications, processors and networks. IBM said the communications methods have been chosen from existing SNA and international standards. IBM said these tools will serve as building blocks for distributed functions required by future SAA applications.

Common Communications Support specifies use of four types of data streams. The 3270 data stream will be used for communications with IBM mainframes, and the 5250 data stream will be supported for interactions with System/3X machines. A third data stream, the Document Content Architecture, defines the rules for specifying the form and meaning of text documents to enable users to exchange documents. The Intelligent Print Data Stream can be used with all points-addressable page printers, and documentation describing this data stream will be available in the third quarter.

Also specified under Common Communications Support is the use of three types of application services: SNA Distribution Services, which supports asynchronous transmissions used with store-and-forward applications; Document Interchange Architecture, protocols that define office automation functions used with a number of IBM products; and SNA Network Management Architecture, protocols that provide a vehicle for monitoring network operations from a central location.

SAA will use LU 6.2, IBM's scheme for program-to-program communications, to supply session services.

Common Communications Support further defines two types of network node interfaces to be supported within SAA: Low Entry Networking supports parallel sessions established between IBM Physical Unit 2.1 nodes directly attached to one another; and X.25 interfaces to attach data terminal equipment, such as host computers, to packet-switched networks.

Data-link controls supported within SAA include Synchronous Data Link Control and IBM's Token-Ring Network.

Finally, IBM said it intends to develop Common Applications that run across SAA environments. The company will focus first on office applications and later on industry-specific packages.

FCC from **page 2**

"The question is, if we let the BOCs loose, how are we going to protect ratepayers from illegal cross-subsidies?"

In examining FCC safeguards back to divestiture, "We're going to see if there have been lapses in the guidelines or in FCC detection and enforcement efforts," said John Luke, director of RCED. "We want to see how the FCC reviews BOC books," he said.

"Several members of the House Telecommunications Subcommittee are very concerned about the FCC's ability to enact new and adequate accounting standards," said Wood, who is heading up the GAO investigation.

Last December, the FCC did away with Second Computer Inquiry rules requiring the BOCs to maintain separate subsidiaries for unregulated businesses. In place of those rules, the FCC enacted the Third Computer Inquiry, which required the BOCs to keep detailed cost-allocation manuals showing how they maintained their ventures as separate lines of business.

Both Computer II and III were designed to allow regulators to track profits and losses of regulated, ratepayer-based services and nonregulated ventures. With the new accounting rules, which allow the BOCs to commingle their regulated and unregulated businesses, the BOCs are more likely to take the profits from regulated business and subsidize new businesses, critics argue.

The Democratic controlled Congress has expressed concern over the FCC's ability to balance ratepayer and telephone company interests in this era of deregulation. The FCC has been moving swiftly to free dominant carriers from predivestiture strictures that it believes no longer fit today's telecommunications environment.

Depending on the GAO's findings and U.S. District Court Judge Harold Greene's decision regarding the Department of Justice's proposal to grant the BOCs even greater freedom to enter new markets, the Telecommunications Subcommittee could take action this fall.

The subcommittee could go as far as introducing legislation either to halt BOC entry into new markets or to require the FCC to apply more stringent methods to control dominant telephone carriers. The GAO is expected to report its findings in August.

Because much of the FCC's BOC safeguards are based on complex analyses of accounting requirements, the GAO is likely to try to determine if the FCC has the economic and manpower resources to regulate in this manner.

The FCC audit division has 30 auditors, but the 1988 budget shows a slight decline in the number of auditors next year. The FCC has told the GAO it plans to rely more on independent accountants to audit the records of the BOCs and AT&T.

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Morgan Stanley from **page 1**

expand its capacity. The link between the systems probably will be through an IBM Systems Network Architecture gateway, Morgan Stanley officials said.

The local net actually comprises four subnetworks, each of which links eight Sun Microsystems, Inc. Model 3110 high-performance workstations with 8M bytes of memory and a Sun Microsystems 3/280F network server with 1G bytes of memory.

The company is also using Sun's Network File System (NFS) networking software and Unix Berkeley 4.2 software. The servers are linked to one another in a ring configuration through Ethernet.

After looking at a variety of alternatives, ranging from networked IBM Personal Computer ATs to superminicomputers, Morgan Stanley felt Sun Microsystems provided the best mix of hardware as well as networking and system software for an automated trading research system.

"Most importantly, we wanted to run a unified operating system environment," said David Shaw, vice-president of automated analytical trading technology. "We chose Berkeley Unix [which Sun Microsystems uses] because it seems to be the leader in experimental research environments.

"We thought about using ATs and putting more computer power in shared nodes, rather than a fully distributed system, but we wanted to have more power as well as high-resolution bit-mapped graphics on the desk," he said.

Morgan Stanley wanted good color graphics because in the research process, "we need to look at data in a lot of different ways," Shaw said. "Color is one way of getting an extra dimension for looking at that data. It also has to be very high resolution for us to get the accuracy we need."

Although other technical workstations provide these features, Morgan Stanley ruled them out. "Sun seemed to be a more open architecture, seemed to be catching on more quickly when we were evaluating it and seemed to be more of a standard for the environment we were looking at," Shaw said.

NFS was also a factor in the company's decision. NFS allows the firm's programmers to write applications that access files remotely without having to know which machine the files reside in on a network.

NFS also allows users to execute tasks on other machines through its Remote Procedure Call feature. "It allows you to look at the whole system as one big unified machine, even though it's physically distributed," said Keith Iverson, a vice-president in the automated analytic trading business unit.

Researchers on the new system will explore more effective ways to identify patterns in the stock market using the algorithms embodied in the software. In the future, the network may also run automated trading programs.

Iverson said he believes Morgan Stanley is at the leading edge in using local networking technology, and he said others in the securities industry are beginning to follow suit.

"In the financial community, these kinds of personal workstations and local networks are likely to be much more prevalent as time goes on, for some of the same reasons that are true in the engineering environment," Shaw said. "One of them is now that processors have become very cheap, it makes sense to get processing as close to the individual user as possible."

Autoswitch from **page 2**

dant, including the central processor and storage.

Additionally, the switch has a unique sampling technique that was designed to eliminate line jitter.

Both Autoswitch models are based on a distributed architecture that cuts cabling costs and gives users design flexibility.

For example, a 256-port satellite-switch cabinet can be located on one floor of a high-rise building and be connected with a single cable to the central matrix switch housed in the computer center. Satellite cabinets can be located up to 300 ft from the central switch.

The Autoswitch 1000 supports four satellite cabinets, whereas the larger switch supports up to 16 satellite cabinets. The smaller model can be upgraded to the larger model.

The Autoswitch 1000 fills a hole in the middle of Bytex's product line. The company's Autoswitch 200 and 400 switches support a few hundred ports, while the Autoswitch 4000 was designed to support a few thousand ports.

The product is expected to appeal to medium-sized banks and other companies that rely heavily on their corporate networks, especially those that may need the upgrade capacity available with the Autoswitch 4000.

Prices for the Autoswitch 1000 range from $300 to $350 per port, depending on user configuration. Production shipments are scheduled for the third quarter of the year.

The Autoswitch 4000 has almost completed beta testing with production shipments scheduled for the second quarter. The Autoswitch 4000 is priced at about $350 per port for an 800-port configuration.

CALENDAR

March 23-26, Chicago — Queueing Systems and Computer Applications. Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

March 24, Washington, D.C. — Resolving Telecommunications Disputes. Also, March 30, San Francisco. Contact: Prentice-Hall Law & Business, 855 Valley Road, Clifton, N.J. 07013.

March 24, New York — A Good LAN is Hard to Find. Also, March 25, Saddle Brook, N.J. Contact: Data Systems Computer Center, 35 Fadem Road, Springfield, N.J. 07081.

March 24-26, Los Angeles — Incoming Call Center Management for Professionals. Contact: Incoming Calls Management Institute, P.O. Box 6177, Annapolis, Md. 21401.

March 24-27, Orlando, Fla. — Data Communications Technology. Contact: Telecommunications Series, Institute for Business and Industry, Valencia Community College, P.O. Box 3028, Orlando, Fla. 32802.

March 25-27, Seattle — Tele-Communications Association Northwest Conference & Trade Fair. Contact: Tele-Communications Association, P.O. Box 3999, M/S 2K-61, Seattle, Wash. 98124.

March 25-27, Miami — Cultivating Corporate Change: The Role of IS Leaders. Contact: Society for Information Management, 1987 Institutional Member Conference, P.O. Box 8302, Chicago, Ill. 60680.

March 26-27, Triangle Park, N.J. — Introduction to Telecommunications Systems: Technologies and Applications. Contact: BCR Enterprises, Inc., 950 York Road, Hinsdale, Ill. 60521.

March 29-April 1, New Haven, Conn. — Association of College & University Telecommunications Administrators (ACUTA) Spring Seminar. Contact: ACUTA, 211 Nebraska Hall, Lincoln, Neb. 68588.

April 1-2, White Oak, Md. — DCA Forecast to Industry. Contact: Armed Forces Communications and Electronics Association (AFCEA) NOVA Chapter, Computer Sciences Corp., 6565 Arlington Blvd., M/C DCA/AFCEA, Falls Church, Va. 22046.

April 6-8, Arlington, Va. — SNA. Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

April 9-10, St. Louis — Understanding ISDN. Also, April 21-22, Boston; April 27-28, Atlanta; May 14-15, Honolulu; May 19-20, San Francisco. Contact: Telecommunications Research Associates, P.O. Box 1200, Newark, Ill. 60541.

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HORRELLSCOPES

BY EDWARD HORRELL

In communications today, it takes more than just good business sense to survive; it requires celestial guidance.



Gemini: Like the Force and like the new INWATS company, United Development Technologies, Gemini has a dark side and a bright side.

INWATS services and alternatives are the next big area of competition in telecommunications.

However, United Development has come up with a product that shows signs of being ruled by Uranus, the planet of losers and bad ideas.

United Development proposes a system that charges users 60 cents for two minutes and guarantees no busy signals and immediate responses. Sounds great so far.

But unlike current WATS systems, United Development proposes to make callers pay for the service. Callers aren't used to paying for WATS and won't take kindly to it.

Another factor in this venture is the competition of such major planets as AT&T, MCI Communications Corp. and US Sprint Communications Co. Anybody who wants to orbit with those companies has to be prepared to fly pretty high.

Horrellscopes doesn't foresee that for United Development just yet.



Leo: The sign of risk takers, gamblers and long-shot shooters has found a perfect private branch exchange at last. Several moons ago, Horrellscopes forecast that PBX manufacturer CXC Corp. was headed for trouble.

The stars don't misguide. Reports are rocketing in saying that sales support for CXC is down around zero.

Start-up systems and distributors are for Leos and others who have a compulsion for gambling. From the beginning, this project was under the sun sign in the fifth house, which clearly marked it as a risky undertaking for all those who depend on their PBX systems.



Virgo: Data communications managers will be in big demand under new regulations requiring companies to decide the type of wiring their communications systems need.

Only a patient, well-ordered, methodical person can cope with the tangled mess left to users by new regulations that get users involved in decisions on building wiring.

The new technology and the regulations will have communications managers making decisions such as whether to choose twisted-pair shielded, twisted-pair unshielded, fiber, coaxial or some combination. The decision depends on how much information is going to be transmitted and whether it is voice, data or both.

Few people — even Virgos — will have the time or energy to invest in learning the technology involved in a decision like this.

Previously, such decisions were the province of the installer or seller. They should be again.



Libra: The telecommunications industry's largest planet, AT&T, needs to find a Libra to pull it through these demoralizing times.

Libras seek harmony and balance and deal with others on a reasonable, sensitive level. Considering how the volatile Scorpios and self-serving Capricorns are running amuck at AT&T, a little balance may be needed.

AT&T psychologists say managers at the company are "very disturbed." That means they may be star-crossed with their zodiac-opposites in top management.

There is also a slight possibility their poor attitudes have something to do with AT&T's constant restructuring, heavy competition, layoffs and high prices that prevent managers from making quotas.

Most of the these managers' hostility is directed at the company. It requires no celestial guidance to see why.

Even AT&T, ruled as it is by Taurus-heads, can surely understand why Horrellscopes predicts a major drop in productivity and further internal upheavals. If nothing happens to change the current course of this industry star, the stockholders who reside in the first house of the zodiac are apt to revolt.

Averting a cosmic disaster at AT&T means coming up with new price cuts, creating a revolutionary new product or finding a Libra from the first and most creative descante of the sign to assume command of the crazy managers at AT&T.



Scorpio: Governed by the planet Pluto, Scorpios are characterized by their eloquence. Few others employ the spoken word with such skill. This trait of eloquence combines with the love of ocean travel to create a problem for communications managers.

Scorpios, who tend to make many overseas calls, are creating problems for certain call detail recording systems. You see, gentle Scorpio, some call detail recording systems can't handle the number of digits required for international long-distance calls. This causes digits to be dropped — and headaches for communications managers.

Managers should be warned: Either get the Scorpios off the line or make sure that any new call detail recording system is capable of handling the required direct distance dialing digits.



Pisces: Don't blame Pisces, but some system maintenance personnel are ripping off PBX circuit boards and reselling them.

With a reputation for honesty and trustworthiness, Pisces must be innocent in these recent circuit board scams.

Users should be warned that an increasing number of PBX circuit boards are being taken. As the resale market grows, so will this problem.

All system maintenance people are not thieves, but many of these PBX rip-offs seem to be perpetrated by those who know what they are doing and where to sell their illegitimate wares.

Unfortunately, there is not much employers can do about stolen circuit boards except to keep track of the serial numbers and be careful about who they allow into their switch rooms.



Capricorn: You like study and deep thinking, and superficial things fail to appeal to you. Your admiration of the intellect knows no bounds and you are tireless in you efforts to cultivate your mind.

So you, dear Capricorn, should tell the Office Automation Society International (OASI) of McLean, Va., to take a long walk off a short planet.

In a recent advertisement in a leading national magazine, the OASI advertised its fourth annual conference and invited readers to become certified office automation professionals (COAP). In very small letters following that statement, the words "without a test!" appear.

In other words, they're saying, "send us a little money and we will certify you as a so-called COAP."

This business has enough problems without unqualified individuals scurrying around with certification initials after their names. If any initials appear after the names of "certified" OASI attendees, they should be BS.



Cosmic catastrophe

What a shame. Touchbase Designs has a good idea that looks like it's turning into a cosmic catastrophe.

Touchbase has introduced a battery-powered modem for use with pay phones. Good idea.

But it's so complicated, it would take the exceptionally perceptive ability of a Pisces to figure out how to operate it.

Picture an ordinary, all-thumbs user with the technological aptitude of, for instance, an Aries, who is standing in an ordinary modern pay phone with this Touchbase modem.

Assume for a rash moment that this Aries at long last figures out how to operate the pay phone successfully. It will be a long time before he breaks the operation code of the Touchbase modem.

By that time, he could have hand-carried the message to its destination.

Touchbase should heed the sage's advice to simplify, simplify!

Horrell is president of Mitchell & Horrell, Inc., a telecommunications consulting firm in Memphis, Tenn.

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